Scientific Review

AND

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A RECORD OF PROGRESS IN ARTS, INDUSTRY, AND MANUFACTURES,

INCORPORATING THE

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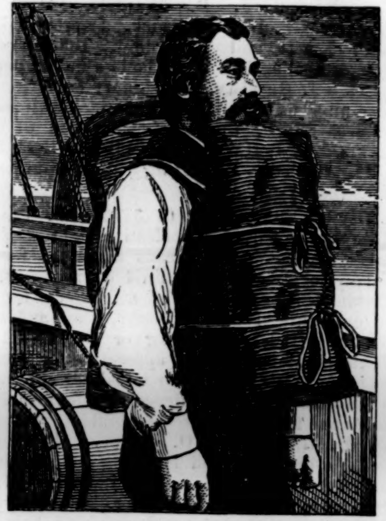

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(*Continued on page* 191).

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DECEMBER 1, 1875.

AFRICAN EXPLORATION.

Geography is without doubt a pleasant branch of knowledge, for its pursuit exercises a spirit of adventure and a high intelligence which cannot be surpassed by anything demanded in the pursuit of science in any branch whatever; no wonder, therefore, that the Royal Geographical Society should be the most popular of our learned societies.

At the present time, geography offers attractions which few can resist; for, owing to the persistent labours of the late Dr. Livingstone,, and the intrepid and determinate enterprise of Mr. Stanley, aided by the *Daily Telegraph* and *New York Herald*, Africa—though by no means unknown to the ancients, and explored by several well-known travellers in recent times—has within the last few years been placed before Europeans almost in the light of a new world.

The magnitude and importance of the discoveries recently made will be readily understood by the address to the Royal Geographical Society of Major-General Sir H. C. Rawlinson, its President, when opening its current session.

After glancing at discoveries made in Equatorial Africa, to which the attention of geographers for so long a period has been prominently directed, as again coming to the front as the scene of the most interesting and important exploration of the year, Sir Henry continued:—In my anniversary address of last May, I ventured to anticipate, from Mr. Stanley's well-known intrepidity and determination, that being once launched into the interior of Africa, with means and appliances of the most extensive and efficient character, it would not be long before he had resolved the doubts which have existed since the first discovery of the Victoria Nyanza as to the true nature of that great Nile reservoir—that is, as to whether it was one large sea studded with islands, as maintained by the first discoverers, Captain Speke and Colonel Grant, or whether it was a mere collection of lagoons, as suggested by Captain Burton and Dr. Livingstone, on the strength of native information. This anticipation has now been realised, and I am enabled, through the kindness of the proprietors of the *Daily Telegraph* and *New York Herald*, to exhibit to this evening's meeting a complete chart of the lake, as delineated by Mr. Stanley, who for the first time has almost circumnavigated its shores. The narrative of Mr. Stanley's cruise round the northern and western shores of the lake, which was entrusted to M. Linant de Bellefonds, whom he met at M'tesa's capital on a mission from Colonel Gordon, has been already published in the columns of the *Daily Telegraph*. The other letters, however, dispatched *via* Zanzibar, and published some weeks ago, have acquainted us with all the main features of this most remarkable journey, which I proceed accordingly to recapitulate. Mr. Stanley, it appears, did not follow the high road from the coast to Unyanyembe, but struck a track further to the east, probably the same by which M'tesa's messengers had previously travelled from Uganda to Zanzibar, and thus reached in 103 days, including halts, the southern shore of the lake, distance 730 miles from Bagamoyo, having fought a severe battle with the natives on the way, and having also discovered and followed to the lake a new river, the Shimeeyu, which rises some 300 miles beyond the Victoria Nyanza, and is thus, as far as our present information extends, the true southern source of the White Nile. Embarking at a short distance to the east of the Jordan's Nullah of Speke in a portable boat, called the Lady Alice, which accompanied the Expedition from England, Mr. Stanley, with a portion of his followers, succeeded in tracing the sinuous shores of the lake along its southern, eastern, and northern sides to M'tesa's capital at Uganda. His description of this very considerable extent of new country—for we knew nothing of it before except from native information—is full of interest to the geographer, and would have entitled Mr. Stanley to a very high place among African discoverers if his explorations had been confined to this single voyage. From M'tesa's capital at Uganda Mr. Stanley followed the western shores of the lake to the river Kagera, the Kitangule of Speke, and then seems to have struck across direct to his station on the shore of Usukuma, leaving the south-western corner of the sea for subsequent explorations. His circumnavigation of the Victoria Nyanza covered about 1,000 miles, and seems to have been verified throughout by a careful series of observations for latitude and longitude. Pending the examination of the register of these observations we cannot affirm that the positions, as laid down on the map, and which differ slightly from Speke's positions, are rigidly correct; but for all practical purposes, Stanley's delineation of the lake may be accepted as sufficiently accurate, and as a great boon to African geography. With regard also to his hypsometrical observations, it is interesting to note that, whereas there was a difference of more than 400 feet in Speke's calculations of height for the northern and southern portions of the lake respectively—a difference which first led geographers to suspect that the lake might be composed of separate basins of varying elevation—Mr. Stanley's measurement by boiling water at his station east of Jordan's Nullah gave a result within seventy feet of Speke's observation near the same spot; so that the height of the Victoria Nyanza may now be considered to be determined at about 3,800 feet above the sea. Mr. Stanley intended, after completing his survey of the Victoria Nyanza, to cross the intervening country to the Albert Nyanza, where he hoped, by means of the Lady Alice, to make a second voyage of discovery round this hitherto almost unvisited lake; but more recent intelligence from the Upper Nile leads us to expect that he will have been anticipated in this second achievement by Colonel Gordon, or by some officers of the Upper Nile command, as it appears that a steamer has at length forced its way to a point above the principal rapids, from whence the passage to the Albert Nyanza is tolerably free from impediment. This important news is contained in telegrams of two different dates in August, sent by Colonel Gordon to General Stone, Chief of the General Staff at Cairo.

These brief telegrams (which Sir Henry read) are not very clear of themselves, as telegrams rarely are, but, read by the light of Colonel Gordon's letters, written during the months of May and June (and which have been published in Paris), supplemented by Lieutenant Chippendall's report of his exploration up the Nile, which was read at the Bristol meeting, they become sufficiently intelligible. Colonel Gordon appears, during the summer, to have forced his way, in Nile boats or nuggurs, from Ragiaf to the mouth of the Asua, the difference of level between these points being over 300 feet. He established stations as he went on at Biddin, at Kerrie, and at Appudo. He was, at the latter place, 140 miles from the Albert Nyanza at the end of August, and was preparing to try the ascent of the rapids at Makedo, eight miles in advance, and where he had already established a station. The Pasha's steamer, Khedive, in the meantime, taking advantage of the rise in the river, had followed in the same course, forcing her way up the rapids at Biddin and Kerrie, and having nearly reached Appudo by the last accounts. The great trial will be the passage of the steamer from Appudo to Makedo, where there are eight miles of continued rapids and cataracts. Baker estimates one single fall at forty feet. If the steamer, with the help of tow ropes, can reach Makedo, the further navigation to the lake, a distance of 130 miles, is without obstacle. Whilst Gordon was occupied with this ascent of the rapids, his assistant Chippendall had pushed on seventy miles beyond Appudo towards the lake, and had conciliated the tribes of the neighbourhood, but had not succeeded in reaching the lake itself. Both he and Colonel Gordon report, from native information, that the Nile leaves the Albert Nyanza by two channels, but where the western stream rejoins the main river is still doubtful. Colonel Gordon is further inclined to give to the Albert Nyanza a general direction of east and west, rather than north and south. He would assign the greatest width of the lake to the latitude of Magungo, where Baker left it, and where a station is now to be established; and he doubts whether the water of this great basin stretches farther south than the Equator. A sketch map of this part of the river by Chippendall has also reached us.

The news of Lieutenant Cameron here given in Colonel Gordon's telegrams, is, no doubt, of somewhat older date than stated, and was probably brought to M'tesa's capital by Arab traders from Unyanyembe. We know from Zanzibar that our envoy finally left Ujiji for the west at the end of May, 1874. Since this date no news of him whatever has been received at Zanzibar, although the direct route to Ujiji is more open than it has been for years past.

News of somewhat later date than these telegrams has since been received, to the effect that M. Linant, the bearer of Stanley's important letter, had been killed, with thirty-six of his followers, in an attack by the Bari tribe, when near Colonel Gordon's station. This lamentable event may possibly retard the execution of this officer's plans. Sir Bartle Frere informs me in a letter just received that his Excellency Nubar Pacha told him another telegram had been received which confirmed the report of young Linant's death and of Gordon's having been obliged in consequence to give up for the time his visit to the Albert Nyanza, in order to go and punish the tribe who had attacked the party. This is the second son that the venerable Linant Bey (the great irrigational engineer of Mehemet Ali and Ibrahim Pacha) has lost in that country. With regard to Colonel Gordon's expedition, Sir Bartle writes: "Everyone speaks most highly of Gordon and his doings—the Khedive and his Prime Minister, as well as the English residents and American missionaries. He has not only, so they all say, really checked the slave trade and still more the slave hunting, but he has made his expedition almost pay itself by economy and by judicious management of the conquered districts."

I have also much pleasure in announcing that his Royal Highness the Prince of Wales, the vice-patron of our society, has just sent to us through Sir Bartle Frere, as the first geographical result of his tour in the East, a very interesting collection of route maps of Upper Egypt and its recently acquired dependencies, which have been executed in the topographical department of the Egyptian War Office, by General Stone, Chief of the Etat-Major, from materials furnished in one direction by Colonel Gordon, and the officers serving under his orders, and in another by Colonel Purdy and the officers of the Darfur Expedition. These maps, which contain much new geographical matter, and which give an earnest of the valuable aid we may expect to receive in the future from General Stone's well-organised department, were presented to his Royal Highness under special instruction from the Khedive, by his Excellency Nubar Pacha, the enlightened Foreign Minister of the Egyptian Government, than whom there is no better friend to geography in the East.

Before I close this brief account of Mr. Stanley's exploration of the Victoria Nyanza—an exploration which does infinite credit to his energy and skill, and which will be explained to you in more detail by the veteran traveller, Colonel Grant, at our next meeting—I am desirous of drawing attention to the extraordinary munificence of the proprietors of the London *Daily Telegraph* and the *New York Herald,* in fitting out this expedition entirely at their own expense. Such munificence far transcends the efforts of private individuals in the cause of science, and even puts to shame our public institutions, enabling, as it did, the undaunted Mr. Stanley to take the field with four Europeans and 300 natives, amply provided with arms, instruments, and supplies, and assured of continued support until he had fairly accomplished his work. And I may add, that the courtesy which has placed at my disposal Mr. Stanley's map of the Victoria Nyanza for the gratification of the fellows of the Geographical Society, and for the general instruction of the public, is a graceful sequel to the liberality of Mr. Stanley's English and American patrons in preparing the original expedition. I feel assured, then, that I only express the feelings of the fellows of the Society in recording our warmest thanks to the proprietors and staff of the *Daily Telegraph* and *New York Herald* for the service they have rendered to the cause of geography, and in wishing the most complete success to Mr. Stanley's further operations.

The President next alluded to the German Expedition to West Africa, from which so much was expected, but which had been unable to penetrate into the interior in the vicinity of the Congo, the same obstacles which baffled Lieutenant Grandy having again, in this case, proved insurmountable. Dr. Gussfeldt, the leader of the expedition, returned to Europe some time back, and his successor, Herr von Homeyer, has since succumbed to the climate, and finally abandoned the enterprise. The only two officers, indeed, who remain of the original party—Dr. Pogge and Dr. Lasaulx—have now, it is understood, shifted their ground to the south, with the intention of starting from the Loanda base and making their way *via* Cassange, and through a comparatively easy country, to the mysterious capital of Matiamvo. On the East Coast of Africa, to the south of what is called the lake region, two British parties are at work, not, indeed, ostensibly for the purpose of geography, but still in very little-known regions, where every step in advance brings with it some discovery. Bishop Steere, in the first place, left Zanzibar about two months ago, accompanied by Mr. Alfred Bellville and two other gentlemen, and piloted by Chumah and Susi, Livingstone's two faithful servants, on a benevolent and important mission. The party, indeed, proposed to cross from Lindy Bay, near the mouth of the Rovuma River, to the eastern, or rather the north-eastern, shores of Lake Nyassa, where they hoped among the friendly Ajao tribe to find a convenient site for the establishment of a missionary station. The other party is that conducted by Mr. E. D. Young, which left England in May last for the purpose of founding a mission station on the southern shores of Lake Nyassa, the friends of the late Dr. Livingstone, in Scotland, having subscribed a sum of about £12,000 for the endowment of this memorial station, to be named Livingstonia, and from whence it is hoped civilisation and Christianity may be gradually diffused through the valleys of the Zambesi and its affluents. By the last accounts, Mr. Young's party, after experiencing some delay at the mouth of the Zambesi, in putting together the steel boat which they had taken out with them, had departed up the river on their interesting and hopeful mission. After a brief and eulogistic reference to the work accomplished in the way of the exploration of Palestine, Sir Henry turned to Central Asia, observing that many valuable additions have been lately made to our knowledge of the country between the Russian frontier and Afghanistan, the result being that by means of Captain Trotter's recent work, and the Russian explorations, geographers will be able at length to construct a reliable map of the region between the Upper Oxus and Jaxartes; which will be further improved, if it be true, as stated in the Russian papers, that, after the complete reduction of Kokand, troops will march from Khojend to Germ in order to bring under control the extensive dependency of Karategin. The island of New Guinea had for some years past attracted much attention, and in the future, probably, it will attract still more attention; for it is almost impossible in the present state of the world, when the nations of Europe have subjugated or colonised so many lands belonging to the Indian Ocean and China Seas, and Polynesia, that this magnificent island, the queen of the Eastern Archipelago, and immediately contiguous to Australia, should remain much longer in isolated and barren independence. The Geographical Society, of course, had no direct concern with questions of colonisation or annexation; they merely took note of such matters in consequence of their bearing on their own legitimate pursuit of geographical knowledge. In regard to New Guinea, while the Society had thus abstained from all participation in recent agitation on the subject, they nevertheless watched with an anxious eye the various maritime surveys which, from time to time, had been executed along the coast-line; and took, further, an especial interest in the expeditions that have attempted—hitherto with very limited success—to advance into the interior of the island. Having noticed the failure of the Italian traveller D'Albertis to obtain a firm footing in the island, and of the Macleay expedition, of the London Missionary Society, to penetrate the rivers on the south-east coast, the President concluded as follows: Within the last day or two I have received further intelligence from Mr. Stone, which is of great interest, and of which accordingly, I add a brief notice. It is the discovery of a river on the south coast of New Guinea which is navigable for nearly 100 miles into the interior, and which has been actually ascended by the Rev. S. Macfarlane and Mr. Stone, in the London Missionary Society's steamer Ellengowan, for a distance of sixty miles. It is proposed to call this the "Baxter's River," after Miss Baxter, of Dundee, to whose generosity the London Missionary Society were indebted for the presentation to them of the Ellengowan steamer, by means of which the southern part of New Guinea has been thus, for the first time, explored.

In concluding his address, the President referred to the Arctic Discoveries, but that matter we reserve for future consideration.

DETECTION OF ARSENIC IN THE AIR OF ROOMS.

H. Fleck has shown in a series of interesting and important experiments that there is arseniuretted hydrogen in the air of rooms, the walls or the carpets of which are coloured with Schweinfurth green. The dust of arsenic mechanically diffused in the air is therefore not the only cause of chronic arsenical poisoning. We must add the arseniuretted hydrogen gas evolved from the decomposition of the free arsenious acid existing in the green. The experiments of Fleck prove that this gas is liberated under the joint action of organic matter and moist air, and its presence is therefore possible wherever free arsenious acid comes in contact with organic matter.—*Zeitschrift für Biologie.*

Reviews.

DARWIN ON CLIMBING PLANTS.

"The Movement and Habits of Climbing Plants." By Charles Darwin, M.A., F.R.S., &c. Second Edition, revised. With Illustrations. London: John Murray, Albemarle-street. 1875.

This essay first appeared in the ninth volume of the "Journal of the Linnean Society," published in 1865. It is now reproduced in a corrected and clearer form, with some additional facts, the illustrations being drawn by the author's son, George Darwin. Fritz Müller, after the publication of the paper, sent to the Linnean Society (Journal, vol. ix., p. 344) some interesting observations on the climbing plants of South Brazil, which are frequently referred to in this work. Recently two important memoirs, chiefly on the difference in growth between the upper and lower sides of tendrils, and on the mechanism of the movements of twining plants, by Dr. Hugo de Vries, have appeared in the "Arbeiten des Botanischen Instituts in Würzburg," Heft. iii., 1873. These memoirs, says the author, ought to be carefully studied by every one interested in the subject, as he can give only references to the more important points. He adds, this excellent observer, as well as Professor Sachs, attributes all the movements of tendrils to rapid growth along one side; but, from reasons assigned towards the close of the fourth chapter, I cannot persuade myself that this holds good with respect to those due to a touch. He also says, in order that the reader may know what points have interested me most, I may call his attention to certain tendril-bearing plants; for instance, Bignonia capreolata, Cobæa, Echinocystis, and Hanburya, which display as beautiful adaptations as can be found in any part of the kingdom of nature. Also, it is an interesting fact that intermediate states between organs fitted for widely different functions may be observed on the same individual plant of Corydalis calviculata and the common vine; and these cases illustrate in a striking manner the principle of the gradual evolution of species.

Like all the works of Mr. Darwin this is interesting and instructive in the highest degree, and the emendations and additions in the present edition have added materially to the worth of the book.

LIPPINCOTT'S MAGAZINE.

"Lippincott's Magazine of Popular Literature and Science, and the size of Ancient and Modern People." November, 1875.

This is an American magazine (Philadelphia), of which Messrs. Trübner are the agents; but it is now circulated largely in England. We were first attracted to the number for last month by an excellent feature, "Our Monthly Gossip." This part of the programme is becoming more common amongst periodicals, and is welcome because often affording new or current information about Science and Literature. Our "yellow friend," Lippincott's wrapper—very striking in this way—takes up the question of the relative size of ancient and modern people. The view chosen is that it is impossible to ascertain the truth about the relative size and physical strength of ancient and modern people, owing to the fragmentary character of the evidence. At a tournament held some years ago at Alton Towers, when the old armour was tried, it was found, as is pretty well known now, a great deal too small. What, then, are we to make of the extraordinary stories on record of the feats of strength of the chivalrous period? The writer on the other hand cites the Chronicle of Turpin, Archbishop of Rheims, describing Charlemagne as eight feet in height, requiring six feet for his girdle, and eating a whole quarter of lamb, two fowls, one goose, a peacock, a crane, or a whole hare; but his father was a dwarf. The prominent men of the American Revolution were above the size of to-day; witness the following table (19th August, 1783):—

General Washington....	209lbs.
General Lincoln	224 ,,
General Knox	289 ,,
General Huntingdon....	132 ,,
General Greaton	166 ,,
Colonel Swift..........	219 ,,
Colonel Michael Jackson.	252 ,,
Colonel Henry Jackson ..	238 ,,
Lieut.-Col. Huntingdon .	232 ,,
Lieut.-Col. Cobb	186 ,,
Lieut.-Col. Humphrys ..	221 ,,

As it might be an assistance in resolving the question, we recall the fact that the Aztecs, whom we chanced to observe at Liverpool, a number of years bygone, were not much bigger than dolls, yet perfect human beings, about the age of nineteen to twenty-one, and symmetrically made in miniature. Were the subject closely followed out it is possible that in the course thereof means of prolonging life and the enjoyment of the various faculties might crop up.

This magazine generally contains more reading than the English monthlies, and it is all very well written; some of the peculiarities of the American mind, however, occasionally showing themselves. But there is a pathos and, strange to say for so fevered a nation, an exceeding repose in the writing, which thoughtful English readers, who are harassed with the cares of the world, would grow fond of, as would also those who have travelled far. The lines entitled "Retrospect" especially contains this pathos, and some simple yearning as well. The number opens with "Up the Thames;" a good account, beginning at Westminster, accompanied with a number of exceedingly pretty little engravings of houses and places on the way; and a chronological comparative description.

An article on "A French Provincial Writer," contains the following—"It is this evil, the habit of trusting to representatives, or the Government, the care of those things, which in a free country, are left to the individual, which constitutes the weakness of French Government." We suggest to English readers and literary men, who take magazines, that they might include a copy of *Lippincott* regularly, as their knowledge of literature and science will thereby be advanced.

We notice a curious feature in regard to the copyright, or publishing laws, of the States, that the words "entered according to Act of Congress, in the year 1875, by J. P. Lippincott and Co., in the office of the Librarian of Congress at Washington," are printed at the foot of the first page of the opening article instead of on the title-page or at the end of the work.

DR. BLAKE'S ZOOLOGY.

"Zoology for Students." A Handbook. By C. Carter Blake, Doct. Sci. With a Preface by Prof. Owen. Daldy, Isbister and Co.

Whether, looking at the estimable works of Professor Nicholson, such a work as this is needed, we will not decide. Perhaps some may, however, prefer Dr. Blake's mode of dealing with the subject, as he bases his information upon the views on Comparative Anatomy of Hunter and Owen.

THE MANORA BREAKWATER.

At the meeting of the Institution of Civil Engineers, held on Tuesday evening, the 9th of November, Mr. Thos. E. Harrison, the President, in the chair, the paper read was on "The Manora Breakwater, Kurrachee," by Mr. William Henry Price, M. Inst. C.E.

It was stated that the Manora Breakwater was the most important feature of the Kurrachee Harbour Works, which were commenced in 1860, from the designs of the late Mr. James Walker, Past-President Inst. C.E., assisted by Mr. William Parkes, M. Inst., C.E. Besides the breakwater the chief works were—in the lower harbour—a stone groyne 8,900 feet long, dredging and removal of rock, and—in the upper harbour—an increase of one-fourth to the area of the backwater, involving a new tidal channel 2½ miles long, crossed by a screw-pile bridge 1,200 feet long, and an embankment 2,780 feet long, to close the old channel, also of a jetty 1,400 feet long with quays. All these works were now nearly completed, and had already produced great benefit, the entrance having been made direct instead of circuitous, deepened 6 feet and sheltered, the anchorage space enlarged, and the internal accommodation improved. The trade of the port was 3½ millions sterling per annum, and railway communication with the Punjab would further develop it. About £450,000 had been expended on the whole of the harbour improvements.

The Breakwater projected from Manora Point for a length of 1,503 feet into a depth of 5 fathoms of water, in order to shelter the entrance from the south-west monsoon seas, and to prevent their tearing up sand from the bottom and depositing it as a bar. The characteristics of the sea, wind, and tides, as bearing on the design, were alluded to, and it was stated that the bottom was irregular near the shore. The structure consisted of a base of rubble stone levelled off generally to 15 feet under low water, and on this base, concrete blocks, each weighing 27 tons, were set on edge, leaning back at a slope of 3 inches to 1 foot, and without bond, two blocks forming the width and three the height, and together making a square of 24 feet in cross sections, the top being about the level of high water The rubble base was deposited from native boats, and was levelled for the superstructure by helmet divers. Two European mason divers were employed, and six native divers trained on the work, the latter chiefly for shifting the rubble. No accident occurred, and the party generally did not suffer in health. After mentioning circumstances which determined the use of concrete blocks and of Portland cement, particulars were given of the composition of a 27-ton block, the materials being cement, river sand, shingle, and quarry lumps, with saltwater. The ratio of the bulk of the cement to that of the finished block was nearly 1-11th. About 3,500 tons of cement were used, costing from £3 17s. to £4 10s. per ton. The mixing station, block ground, and moulding of the nineteen hundred and seventy-two blocks, including three hundred and twenty five of special smaller sizes, were then described; and it was remarked that the "Messent" mixers had been found very efficient. The blocks were sometimes used one month after being made, and once, as an experiment, a 27-ton block was safely lifted in seven days. When the work was fairly established the blocks cost for current expenses 15s. per cubic yard, though the average total rate was raised beyond this by extra expenses in the earlier stages.

The blocks were lifted on to the trucks by a steam hydraulic travelling crane of 50-feet span; each truck carried one block, and was taken separately by a tank locomotive to the breakwater. The blocks were set by a steam travelling crane, called the "Titan," which ran on rails laid on the finished work, and overhung the end, so as to carry the blocks of three tiers in advance to their places, thus dispensing with staging. The framing of this crane supported a traveller and crab, worked by an 8 h.-p. engine on the top, which also drove the travelling gear of the entire machine. The cost of the Titan, delivered and erected at Kurrachee, was £2,879. The rate of setting was limited by the progress of the foundation and by the supply of blocks, but during the last season ten 27-ton blocks were set daily on an average, while on one occasion six blocks were laid in one hour and forty minutes without special pressure.

The base was commenced on the 17th of March, 1869; and later in that year the shore end "stump," 45 feet long, to make a starting place for the Titan, with other preparatory works, was completed, after some unavoidable delays, and the first block was set on the 1st of November, 1870. The delays of the foundation were specially felt in the first season's work, but a length of 225 feet was built in four months, taking the breakwater out to 270 feet from the shore. During the second season, 1871-72, after a few days spent in repair of monsoon damages, a length of 523 feet was built in about four months, making a total of 793 feet. During the third season, after the repair of monsoon damages, a length of 710 feet was built, completing the breakwater on the 22nd of February, 1873, to its full length of 1,503 feet, which had thus been barely twelve months in actual building.

The action and effect of the monsoon sea, and the repair of damages were then detailed. In 1871 the centre joint opened here and there, and one block was washed over from the top course on the harbour side. Slight damage also occurred to the shore end in the sea angle. The nature of the settlement was described, also a curious rocking action, and the closing up of the cross joints under the action of the sea. The repairs of the damage, in the first season, cost £185. During the second monsoon, 1872, twenty-five blocks were washed out from the top course on the harbour side, eighteen of these blocks being in one length of 86 feet. The damage was again traceable to inequality of settlement. The sea side did not suffer, nor did the shore end, though both showed evidence of the force of the sea. The damage was repaired in a few days at a cost of £512. The monsoon of 1873, the first after the completion of the breakwater, did trifling damage, and was confined to the shore half length, still pointing clearly to the weakness of foundation. The repairs cost £199. In the monsoon of 1874, the outer end and "scar," which had not then been in any way specially secured, lost five blocks during unusual weather, though no other part of the outer half length suffered, but the shoreward half opened here and there. The repairs of this season cost £418, and included the re-erection of an iron beacon on the outer end. The nature and extent of the subsidence (which in some parts amounted to 3 feet, but without dislocation), were then noticed, and the action of a mollusk, the "Pholas," on the concrete blocks, also the effects of the sea on the rubble base, which did not, however, affect the stability of the superstructure.

The cost of the breakwater had been £93,565, or £62 5s. per lineal foot, but this amount included preliminary charges, the current expenses during the last season being only £34 per foot. This sum included the repair of damages during the progress of the work, and during the two monsoons since its completion, but not the expense of engineering and office establishment. The work had been carried on in the Bombay Public Works Department by the author and his assistants, advised by Mr. William Parkes, M. Inst. C.E., as Consulting Engineer, and without the employment of any general contractor. The completion of the work was favourably noticed by the Government authorities concerned.

FLAMM'S KRYPTOGRAPH.

This invention consists in the use of improved arrangements and apparatus for corresponding in cypher, either by visiting card, post card, letter, or telegram. It is invented by M. Anton Louis Flamm. The message transmitted can be writtten and read almost as quickly and as easily as ordinary writing or reading by the use of this apparatus, which brings the letters of the message into such a confusion that the correspondent alone being in possession of a duplicate of the identical apparatus, is able to understand it. The mathematical arrangement upon which the inventor's system is based will enable him to manufacture an unlimited number of apparatus, so completely differing in construction one from the other, that it will be possible, he considers, for every person in the world to be possessed of an apparatus, and yet be unable to decipher a message cyphered by means of another apparatus, thus proving its absolute impenetrability except to correspondents having the *identical* apparatus.

The reader, in order to fully understand the nature and mode of working the apparatus, should suppose the apparatus before him, and proceed paragraph by paragraph:—

The apparatus (in the shape of a pocket-book) consists of four parts—(1) the folding tablet, (2) a folding metallic perforated plate, (3) the paper to be used, which will be found in the compartment of the pocket-book, and (4) a pencil.

The tablet, which we will presume is now before the reader, bears on the top edge, or rim, the word "Horizontal," and on the left-hand side of the tablet will be observed the word "Vertical." On each of the four edges or frame are placed figures from 1 to 14, and on the tablet proper are 14 lines ruled in the horizontal direction, and the like number ruled in the vertical way, which form 196 small squares of one centimètre each, and 14 columns in the "vertical" and the same number in the "horizontal."

The folding metallic plate precisely of the same size, when opened, as the tablet within the frame, bears in each corner one of the Roman numerals I. II. III. IV. The plate is marked with square divisions, corresponding exactly with those on the tablet, and perforated in 49 different squares.

The paper used for telegrams is ruled with the same number of lines as the tablet and plate, and contains 196 squares of one centimètre each.

Observation.—On the edges of the tablet will be found 4 small drawing pins, to be used for fixing the paper upon the tablet.

How to Transmit a Cyphered Message Either by Post or Delivery.

1. The writer, according to the length of the message he desires to send, should choose the size of the paper: for instance, if a visiting-card be large enough to contain his message, the writer must place it on the tablet in the left-hand top corner, and, in order to secure it from shifting, fasten it with one of the pins. Now the metallic plate must be placed over the card first with the corner bearing the Numeral I. in the left-hand corner of the tablet, and the writer then commences to fill into each of the holes through which the card appears the words of the message, letter by letter, and line by line, successively. This having been done while the plate was in its first position, the corner of the plate bearing Numeral II. must now be turned into the same left-hand top-corner of the tablet, and the writing of the message continued as before. When this second position is finished, the plate with its corner, bearing Number III., is brought again to the left-hand top corner of the tablet. The writing again goes on the same way, and when the holes are filled the IV. is turned in the same direction, and the remainder of the message filled in exactly as before.

2. If the writer, having finished his message while the plate is in its IVth position, finds there are still empty places appearing through the plate on the card, he is requested to fill them up with an insignificant word or letter until the last hole of this IVth position is filled up. The card will then be found full, and the message absolutely impenetrable to other than the person correspond with, who is provided with a duplicate of the identical apparatus.

3. The same method should be followed when a post-card is used for the message. A sheet of paper not exceeding the size of the tablet can be used in the same way, and if not sufficient to contain the message, a second, and third, and so on, may be used until the message is exhausted. However, care must be taken to observe always that in the last sheet, if not fully occupied when the plate has arrived at its IVth position, the spaces remaining empty should be filled up, as mentioned in paragraph 2.

4. The person in receipt of a message either upon a visiting-card, post-card, or by letter, commences by first placing the card or paper in the left-hand top corner of his tablet, securing same by a pin, as previously described; and, secondly, by putting the plate upon the tablet so that the corner marked I. is upon the left-hand top corner, and having read so much of the message as appears through the holes, the plate is now turned to the second position, and so on, until the third and fourth positions have likewise been successively read. In case there be more than one sheet, the same mode of proceeding is to be repeated with the following sheets.

Despatches by Telegram.

5. The International Telegraph Service allowing for cypher despatches only five cyphers or letters to count for one word, the inventor recommends that his paper, which is ruled into small squares, should be cut into slips containing five vertical columns, so that each slip contains space for a message of fourteen groups of five letters each.

Having cut paper into slips of five columns, the sender of the message commences by writing free and out of the apparatus letter by letter, line by line, into the squares, placing the letter as nearly as possible in the centre of each square. Should the intended message contain less than fourteen groups of five letters, then cut off the portion of the slip below the last line used. As it is likely there may remain from one to four spaces unfilled for the purpose of the despatch on the last line, the writer must in every case fill up the blank squares remaining on the last line of his message with one, two, three, or four meaningless letters, as the correctness of deciphering depends upon this being done. If more than fourteen groups be required a new slip must be taken, and the writing continued in the same way until the message is completed. The whole of the second or further slip not being required, the lines not used are to be cut off, and empty squares on the last line filled out as just now stated. The slip of paper, or if more than one the first, is then to be placed at the left-hand top corner of the tablet as before described for cards in paragraph 1, and the plate put upon it in the first position. The letters now appearing through the perforations must be copied and written in consecutive groups of five letters on any ordinary telegram form, and so continued until the plate has been successively passed through all the four positions as before described in paragraph 1. The form so filled up can then be sent to the telegraph office for transmission, the sender retaining his copy or original slip for reference at any future time. Another advantage of this invention is that where an employer prefers that his clerk should be ignorant of the contents of the message, and at the same time being too much occupied to copy it himself, he can dictate it to his clerk as the letters appear in his apparatus, which the clerk will write without understanding a single word of what he has written.

Deciphering Telegrams.

6. The person to whom the cyphered despatch is sent, on receipt of it, has only to count the number of groups he receives, always bearing in mind that each consists of five letters, and, by dividing the total by fourteen (the number of lines or groups on each slip), it will be at once seen what number of slips and the additional or part of a slip have been used by his correspondent in transmitting the message. Knowing by this means the number of slips required, the first one must be taken and fixed at the left-hand top corner of the tablet, as in paragraph 1.

Now, the receiver must lay his plate, beginning with No. 1 corner, in the left-hand top corner of the tablet over the slip and copy successively, letter by letter and line by line, the telegram received, through the holes presenting themselves through the plate in each of the four positions one after the other, in the same manner as before described. When all the holes in the fourth position have been filled up and the plate is withdrawn, the receiver can read that part of the copied message in the same way as he would an open letter. The next following slip or slips are likewise treated in the same way until all the letters contained in the telegram have been copied. Of course, the receiver of a telegram will first number the slips he is about to use, to ensure their proper order.

The same remarks as to utilising the clerk of a principal in the copying of messages sent, also applies for the deciphering purpose, as the employer can hand the apparatus to his clerk, who writes under his dictation letters of the telegram received, until he has completed the fourth position. The principal then sends his clerk away, and removing the plate himself, he only is in possession of the secret of the message received.

SUBJECTS FOR PAPERS AT THE INSTITUTION OF CIVIL ENGINEERS.

The Council of the Institution of Civil Engineers invite communications, of a complete and comprehensive character, on any of the subjects included in the following list, as well as on other analogous questions. For approved original communication, the council will be prepared to award premiums, arising out of special funds bequeathed for the purpose, the particulars of which are as under:—

1. The Telford Fund, given "in trust, the interest to be expended in annual premiums, under the direction of the council." This bequest (with accumulations of dividends) now produces nearly £260 annually.

2. The Manby Donation, given "to form a fund for an annual premium or premiums for papers read at the meetings," of the value of £10 a year.

3. The Miller Fund, bequeathed by the testator "for the purpose of forming a fund for providing premiums or prizes for the students of the said institution, upon the principle of the 'Telford Fund.'" This fund (with accumulations of dividends) now realises about £170 per annum. Out of this fund the council have determined to establish a series of scholarships,—to be called "The Miller Scholarships of the Institution of Civil Engineers,"—for papers from students, and to award one such scholarship, not exceeding £40 in value, each year, and tenable for three years.

4. The Howard Bequest, directed by the testator "for the purpose of presenting periodically a prize or medal to the author of a treatise on any of the uses or properties of iron, or to the inventor of some new and valuable process relating thereto, such author or inventor being a member, graduate, or associate of the said institution." The annual income amounts to rather more than £16. It is proposed to award this prize every five years, commencing in 1877.

The council will not, in any case, make an award unless a communication of adequate merit is received; but, on the other hand, more than one premium will be given, if there are several deserving memoirs on the same subject. In the adjudication of the premiums no distinction will be made between essays received from a member, an associate, or a student of the institution (except in the cases of the Miller and the Howard bequests, which are limited by the donors), or from any other person, whether a native or a foreigner.

List.

1. On the Flow of Fluids, liquid and gaseous.
2. On Portable Apparatus for Guaging the Materials, and for the Expeditious Mixing of large quantities, of Portland Cement Concrete.
3. On the Value and Strength of the different Materials used for making Concrete: with Experiments on Proper Proportions of the various ingredients, and of the Water, whether salt or fresh, to produce the Strongest Mixture.
4. On the Application of Steam Machinery for Excavating, and the Cost as compared with Hand Labour.
5. On Stone-quarrying and Stone-working Machinery.
6. On the Manufacture of Cast and Wrought Iron and Steel of various qualities; on the effect of the Admixture of Foreign Substances; and on the Experimental Tests by which the Quality may be ascertained.
7. On the Process of Forging by Steam Hammers and other Percussive Machinery, and by the Hydraulic Press.
8. On the Effects of Pressure on Cast Steel in the mould.
9. On the Results of Experience in the recent Extended Use of Steel in Mechanism and in works of Construction.
10. On the Alteration in the Condition of Metals caused by use or wear.
11. On the best Mode of Uniting Steel and other Metal employed in Construction and in Boiler Work, and on the Effect of the Operations of Punching, Drilling, and Riveting on such Metals.
12. On the Construction of Warehouses and other buildings for storing Goods, with the Special View of resisting Fire, and on the relative Merits of brickwork, iron, and timber for that object.
13. On the Construction of Street Tramways, the best means of adapting them for the conveyance of passengers and goods, and of preventing injury and inconvenience to other carriages travelling on the same roads.
14. On Modern Methods of Constructing the Foundations of Bridges.
15. On the Design, generally, of Iron Bridges of very large span, for Railway traffic.
16. On the Comparative Merits of European and American Wrought Iron Railway Bridges.
17. On Canal Locks, Inclined Planes, and other modes of overcoming differences of level on Canals.
18. On Dock Gates and Caissons, including a Description of the requisite external and internal arrangements, with recent practical examples.
19. On Percussive and other Rock Drills.
20. On the Appliances and Methods used for Tunnel Driving, Rock-boring, and Blasting, in this country and abroad, with details of the cost and of the results attained.
21. On Railway Rolling Stock Capacity in relation to the dead weight of the vehicles.
22. On the best mode of Testing Iron and Steel Rails for Railways.
23. On the Water Supply of Towns, including a description of the sources of supply, of the different modes of storing, collecting and filtering water, of the various incidental works, of the distribution to the consumers, and of the general practical results.
24. On the Constant Service of Water Supply, with special reference to its introduction into the Metropolis, in substitution for the Intermittent System.
25. On the various Modes of Dealing with Sewage, either for its disposal or its utilisation.
26. A History of any Fresh-Water Channel, Tidal River, or Estuary,—accompanied by plans and longitudinal and cross sections of the same, at various periods, showing the alterations in its condition,—including notices of any works that may have been executed upon it, and of the effects of the works.
27. On the relative Value of Upland and of Tidal Waters in maintaining rivers, estuaries and harbours.
28. On the different Systems of River and Canal Towage.
29. On Improvements in the Construction of Furnaces and on Combustion.
30. On the Construction of Steam Boilers adapted for very High Pressures.
31. On the best practical Use of Steam in Steam Engines, and on the effects of the various modes of producing Condensation.
32. On the Results of Experiments on Steam Jacketing.
33. On the Modern Construction of Marine Engines, having reference to Economy of the Working Expenses, by Superheating, Surface Condensation, High Pressure, great Expansion, &c.
34. On the Construction of Portable Steam Engines, or other Motors, of very light weight, suitable for light boats, aerial machines, &c.; and on Condensing with Air.
35. On the relative Cost of the Conveyance of Coal by Rail and by Steamer, and on the best mode of loading and unloading to diminish breakage.
36. On the various descriptions of Pumps employed for Raising Water or Sewage, and their relative efficiency.
37. On the employment of Wind or Water as a Motive Power, their relative advantages and disadvantages compared with Steam Power, and the Motors most suitable for utilising them in the best manner.
38. On the Use of Gas as a Motor.
39. On the best Methods of Removing Grain in bulk from a Ship to a Warehouse, for distributing in the Warehouse, and on the various modes in which grain is stored in bulk.
40. On the Manufacture of Mineral Oils, and the Lamps best adapted for their consumption in dwellings and lighthouses.
41. On the "Output" of Coal in the United Kingdom, as compared with that of other countries, illustrated by statistical tables, plans, and diagrams, showing where Coal is produced, and where and how it is consumed.

42. On the Sinking to, and Machinery applied at, deep Coal Mines (in Saxony, for instance), with a notice of the modifications necessary in future Coal Mining Operations suggested (or indicated) by the working of deep sinkings.

43. On the Ventilation and Working of Railway Tunnels of great length.

44. On Compressed Air as a Motive Power, particularly as applied to Machinery in Mines and to Locomotives in Tunnels, with some account of its application on the Continent; and generally on the Methods of Transmitting Force to distant points, including Details of the existing systems of Rope Transmission.

45. On the Dressing of the Ores of Lead, Copper, Zinc, and Tin, by any other process than that of Water, and on the Smelting of such Ores, with details of the results and cost by different methods.

46. On the Washing of Small Coal, and the Manufacture of Coke and Artificial Fuel.

47. On heavy and light Wood Working Machinery.

48. On Pneumatic Telegraphs, and on Pneumatic Despatch Tubes, designed with a view to economical working, and to the attainment of high speeds in long lengths of pipe.

49. On recent Progress in Telegraphy, including a notice of the theoretical and practical data on which that progress has been based; with some account of the improvements in the construction of land and sea lines and in the working instruments.

Instructions for Preparing Communications.

The Communications should be written in the impersonal pronoun, and be legibly transcribed on foolscap paper, on the one side only, leaving a sufficient margin on the left side, in order that the sheets may be bound. A concise abstract must accompany every Paper.

Two series of illustrations are required for ever Paper accepted for reading. One set of Wall Diagrams, sufficiently large and boldly coloured, so as to be clearly visible when suspended in the Theatre of the Institution; and a set of drawings on tracing paper, to as small a scale as is consistent with distinctness, ready to be engraved for insertion in the Proceedings. The Wall Diagrams will be returned.

Papers which have been read at the Meetings of other Societies, or have been published in any form, cannot be read at a Meeting of the Institution, nor be admitted to competition for the Premiums.

The communications must be forwarded to the house of the Institution, No. 25, Great George-street, Westminster, S.W., London, where any further information may be obtained.

Charles Manby, Honorary Secretary.
James Forrest, Secretary.

Premiums Awarded by the Institution of Civil Engineers during Session 1874-75.

The Council of the Civil Engineers have awarded the following Premiums:—

1. A Telford Medal, and a Telford Premium, to William Hackney, B.Sc., Assoc. Inst. C.E., for his paper on "The Manufacture of Steel."

2. A Telford Medal, and a Telford Premium, to Harry Edward Jones, M. Inst. C.E., for his Paper on "The Construction of Gasworks."

3. A Telford Medal, and a Telford Premium, to Alexander Richardson Binnie, M. Inst C.E., for his Paper on "The Nagpur Waterworks, with Observations on the Rainfall, the Flow from the Ground, and Evaporation at Nagpur; and on the Fluctuation of Rainfall in India and in other places."

4. A Telford Medal, and a Telford Premium, to George Frederick Deacon, M. Inst. C.E., for his Paper "On the Systems of Constant and Intermittent Water Supply, and the Prevention of Waste, with special reference to the restoration of Constant Service in Liverpool."

5. A Telford Premium to Jules Gaudard, C.E., of Lausanne, for his "Notes on the "Consolidation of Earthworks."

6. A Watt Medal, and the Manby Premium, to John Clarke Hawkshaw, M.A., M. Inst. C.E., for his Paper on "The Construction of the Albert Dock at Kingston-upon-Hull."

7. A Telford Premium to Professor Joseph Prestwich, M.A., F.R.S., Assoc. Inst. C.E., for his Paper "On the Origin of the Chesil Bank, and on the Relation of the existing Beaches to past Geological Changes independent of the present Coast Action."

8. A Telford Premium to Josiah Timmis Smith, M. Inst. C.E., for his Paper "On Bessemer Steel Rails."

9. A Telford Premium to Charles Colson, Assoc. Inst. C.E, for his "Details of the Working Tests and Observations on Portland Cement, made during the Construction of the Portsmouth Dockyard Extension Works."

10. A Telford Premium to Thomas Colclough Watson, M. Inst. C.E., for his "Description of the Use of Facines in the Public Works of Holland:—

The Council have likewise awarded the following Prizes to Students of the Institution:—

1. A Miller Prize to Arthur Ernest Baldwin, Stud. Inst. C.E., for his Paper on "The Design and Construction of Lock Gates."

2. A Miller Prize to James Charles Inglis, Stud. Inst. C.E., for his Paper, "Experiments on Current Meters and their Bearing on the Hydraulics of Rivers."

3. A Miller Prize to William Beswick Myers, Stud. Inst. C.E., for his "Comparison of the various forms of Girder Bridges, showing the Advantages of the Schwedler Bridge; together with an elucidation of the Theoretical Principles of the same."

4. A Miller Prize to Arthur Spence Moss, Stud. Inst. C.E., for his Paper on "The River Humber."

5. A Miller Prize to William Patterson Orchard, Stud. Inst. C.E., for his Paper on "Hydraulic Calculations relating to Water Pressure and Walls to resist it, Gauging of Water, the Flow of Water in Open Channels and in Pipes."

6. A Miller Prize to Joseph Tysoe, Stud., Inst. C.E., for his Paper on "The Manufacture of Illuminating Gas from Coal."

7. A Miller Prize to John Charles Mackay, Stud. Inst. C.E., for his Paper on "Concrete."

FREEZING MIXTURES.

One of the most familiar is the common freexing mixture, which generally consists of equal parts of pounded ice or snow and salt, which produces a reduction of temperature to about — 16° C. (3·2° Fah.), and is often used for making ice creams, &c. If, instead of salt, we used three parts of crystallized chloride of calcium at 0° (32° Fah.), and two parts snow, we obtain a far more powerful freezing mixture, the temperature falling to about—45° (—49° Fah.). and quite sufficient to freeze mercury. The salt in the first instance melts the ice, the water thus formed in its turn melts the salt; so we have both the solids changing to the liquid state simultaneously, consequently absorbing a large amount of heat. For a similar reason, the solution of most salts in water is accompanied by the absorption of a large amount of heat; nitrate of potash and chloride of potassium both cool the water in which they are dissolved.

A useful machine is now made for freezing water without the use of ice, which cannot always be obtained, by mixing together powdered sulphate of soda and common hydrochloric acid. The apparatus consists of an upper and lower thin chamber, the upper one having two inner casings and an interior revolving inner cylinder, capable of being turned by a handle at the top. The freezing mixture is placed in the inner casing, and the water to be frozen in the outer casing and in the revolving cylinder. Several vanes are fixed on the outside of the cylinder, so that, when it is turned by the handle, the acid and sulphate are kept constantly mixed. After sufficient ice has been made, the water is drawn off into the lower chamber, which is prepared for holding a number of bottles of wine to be cooled by this liquid.

WORKING MEN AND THE PATENT LAWS.

At the Trades Union Congress at Glasgow the following resolution on the subject of Patent Law Amendment was passed on the motion of Mr. M. Prior, Sheffield, seconded by Mr. Womack:—

"That the Patent Laws require immediate and thorough reform in the interest of our national industries, especially so as to do justice to the numerous inventors among the working classes by enabling them to secure to themselves the benefit of their inventions, which the present high scale of Government charges and the complicated system of the Patent Laws practically prohibit, and that it be an instruction to the Parliamentary Committee to use every effort in its power to bring in a bill embodying the necessary reform."

The resolution was unanimously agreed to.

This was followed up by a Memorial to Government being adopted. We understand that our friend, Mr. H. Broadhurst, now the Secretary of the Parliamentary Committee of the Trades Congress, had prepared a resolution to submit to the Congress; but it was deemed right to leave the matter in the hands of Mr. M. Prior.

PURIFICATION OF SPIRITS.

It is well known that the deleterious effects of drinking ardent spirits is largely due to fusel oil, which is almost universally present in spirits, such as brandy, whiskey, and other spirituous liquors. By a system of distilling in vacuo, Mr. Marshall Mason Harris has, it appears, succeeded in eliminating this unsanitary element from these well-known spirits, at the same time removing other objectionable impurities. At a trial of the process, conducted under the legalized supervision of the Inland Revenue officers, at Mr. Harris's works, near the Metropolitan Cattle Market, Camden Town, the working of the process was, on Friday, 26th ult., shown to a number of scientific and practical gentlemen, amongst whom were the well-known names of Dr. Versman, Dr. J. McGregor Croft, Dr. Jeffreys, Mr. F. W. Campin, and others, who expressed their approval.

The angular velocity of clouds is determined be M. Hursan de Villeneuve in the following way: He takes a ball of silvered glass, on which he draws with ink an equator and equidistant meridians. He places the sphere so that the axis being horizontal, the cloud may be seen, by reflection, displaced along the equator traced, and then the time which it takes to go from one meridian to the next gives the angular velocity.

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The SCIENTIFIC REVIEW, being well read by Manufacturers and Capitalists interested in inventions and enterprises for the promotion of industry, will be found a desirable medium to many Advertisers.

To Correspondents:—SCIENTIFIC COMMUNICATIONS AND BOOKS FOR REVIEW to be addressed to the Editor at this office; as also letters respecting ADVERTISEMENTS, SUBSCRIPTIONS, &c.—Correspondents are desired to keep copies of their communications, as the Editor cannot undertake to return them.

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NOTICE TO OUR SUBSCRIBERS AND READERS.

Arrangements are progressing for the improvement and ultimately the enlargement of the SCIENTIFIC REVIEW.

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Past Presidents:

SIR DAVID BREWSTER, K.H., LL.D., F.R.S., &c., from the establishment of the INVENTORS' INSTITUTE, till his decease, February, 1868. LORD RICHARD GROSVENOR, M.P.

President of Council:

SIR ANTONIO BRADY.

SESSION 1875-76.

Thursday, Dec. 9th.—On the Position and Prospects of the Patent Question. By F. W. Campin, Esq., Barrister-at-Law, Secretary of the Institute.

Thursday, Dec. 23rd.—On Appliances for Railway Safety; and (if time) Discussion on Patent Question.

N.B.—Members are specially invited to read Papers at the Members' Meetings during the Session.

Council Meetings at 7 p.m.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.
F. W. CAMPIN, Sec.

Proceedings of the Institute.

AT the Meeting of the Executive Council of the Inventors' Institute, held on the 28th October, after the minutes of the last meeting were confirmed as being correctly entered, the question of the arrangements for the Session 1875-76 were considered, and the List of Meetings settled. Subjects for consideration and discussion at the Members' Meetings were left for future appointment.

At the meeting of the Executive Council, held on 25th of November, previous to the Members' Meeting, after the passing of the minutes, the Secretary read a letter from Mr. Carttar, resigning the Auditorship of the Institute. This resignation was accepted with expressions of regret. Some routine business was transacted, and the meeting ended.

The Members' Meeting afterwards held was presided over by Dr. J. McGregor Croft, when the Opening Statement for the Session was presented by Mr. Campin, the Secretary, who announced that at the meeting to be held 9th December, he would read a paper on the Present State and Future Prospects of the Patent Law Question.

Monthly Notices.

Prevention of Boiler Explosions, amongst some other questions of practical public utility, occupied the attention of the Trades Union Congress at Glasgow, and the following resolution was agreed to, viz.:—"That, in consequence of the numerous disasters that are so frequently occurring through steam boiler explosions and other steam machinery accidents, most of which occur through the incompetency of the person in charge, this Congress would impress upon the Government the necessity of giving immediate attention to this question, and that no one be allowed to take charge of steam machinery without holding a certificate of competency, granted by examiners appointed by the Board of Trade, similar to those granted to marine engineers." Mr. M. Prior, of Sheffield, moved, and Mr. Gilliver, of Birmingham, seconded, this motion, which was unanimously agreed to.

The new annual by the authors of "The Coming K——," &c., will bear the title of "Edward the Seventh."

"L'Histoire du XIXe Siècle" of Michelet, the work interrupted by the death of the great writer, is continued in the second and third volumes, now announced as ready. The first volume was "L'Origine des Bonaparte"; the present are entitled "Jusqu'au 18 Brumaire" and "Jusqu'à Waterloo." The appearance of these volumes must, of course, close that great series which, under the names of "Histoire de France" and "Histoire de la Révolution Française," has dealt with the history of nearly twenty centuries.

At the investiture of the Star of India at Calcutta, we have reason to believe (says the *Athenæum*) that General Cunningham, Director of the Indian Archæological Survey, will be knighted, with Dr. George Birdwood, to whose official services Bombay owes so much. The Hon. Col. Coleman, of Madras, will also be knighted. He is of the Madras Council, and is the undisputed leader of the Eurasian community in India. Amongst nine other names before us are mentioned those of Col. Michael, Drs. Bühler and Beames, Messrs. Knight, Hunter, Wilson, and Arbuthnot, for the honour of C.S.I. Mr. Brian Hodgson, is to be knighted. We need not refer to a large number of native names before us, of Hindoos, Mohammedans, and Parsees, about to be honourably distinguished by the Prince of Wales.

A Supplementary Meeting of the Iron and Steel Institute was, in consequence of the time at the Manchester Meeting being insufficient to allow of the reading and discussion of several papers that were upon the programme, decided to be held on Thursday last, at the Rooms of the Institution of Civil Engineers.

The first course of University lectures in Dundee was begun recently, when Prof. Nicholson lectured "On the Laws of Geological Action."

The death of Mr. Charles B. Vignoles, F.R.S., the civil engineer, took place at his country seat, Hythe, Hants, on Wednesday last, at the advanced age of eighty-two years. Mr. Vignoles was for some years in the army, having been gazetted to an ensignship in his father's regiment, the 43rd Infantry, when he was quite a child. He was early left an orphan, and was educated under the care of his grandfather, Dr. Charles Hutton, the celebrated mathematician, who was then Professor at the Royal Military Academy, Woolwich.

Sir William Thomson, at the opening meeting of the Philosophical Society of Glasgow, gave an account of La Place's and Airy's Dynamical Theories of the Tides. After discussing in detail the several theories propounded, he showed, in conclusion, that in certain parts of the British Seas a state of tide could be made out having some resemblance to the motion of sound on a vibrating plate, there being lines along which the water was heaped up, while there were others of comparative rest.

A New Relation between Electricity and Light is the subject of a paper by Dr. Kerr, of Glasgow, in the *Philosophical Magazine*, in which he shows, that when glass, which in its normal condition is a single-refracting medium, is properly subjected to the action of intense electrostatic force, it acquires a molecular structure, and the property of double refraction. A Rhumkorff's induction apparatus was employed, and a block of plate-glass served as the dielectric medium, whilst polarized light was transmitted through the glass in a direction perpendicular to the lines of electric force. Under these conditions the glass acts as though it had suffered compression along the lines of force, or, in other words, it becomes a negative uniaxial medium. Similar results were obtained with other dielectrics, the action of resin, however, being contrary to that of glass, or positive.

Proceedings of Societies.

GEOGRAPHICAL SOCIETY.

November 15th.—Major-General Sir H. C. Rawlinson, President, in the chair.—The following gentlemen were elected Fellows: General C. M. P. Stone, Honorary Corresponding Member; Lieutenant C. M. Watson, Messrs. J. M. Dunn, A. E. Ghewy, E. H. King, and T. S. Taylor. The President gave his opening address. The paper read was, "Journey across the Vatna Yokull, Iceland," by Mr. W. L. Watts.

ASTRONOMICAL SOCIETY.

November 12th.—Professor Adams, President, in the chair.—A valuable series of solar photographs was presented to the Society by the executors of the late Professor Selwyn. They represent a period of rather more than eleven years, and so cover a complete cycle of Sun spot frequency. The negatives are open glass, and have been taken upon a scale of four inches to the Sun's diameter. The casket in which the freedom of the City of London was presented to the Astronomer-Royal was shown to the meeting, and Sir G. B. Airy gave an account of the work that had been going on at the Observatory during the recess. Attention has been paid to the positions of the satelites of Saturn in connection with the ephemerides, which have been published by Mr. Marth in the *Monthly Notices* and *Astronomische Narchrichten*. A new eight-year Greenwich Catalogue of stars is being published. Stellar spectroscopy has also been energetically followed up, and although the observations were at first somewhat discordant, latterly they have grown more consistent and the results which have been obtained in the main verify those of Mr. Huggins as to the approach and recession of stars from and towards us in the line of sight. The Astronomer-Royal remarked that Mr. Huggins had in this direction had the privilege of starting a new science, and it would be their duty at the Observatory to revise it. They intended to follow up the matter yet further, but there were great difficulties still to be overcome—difficulties which no one could appreciate who had not attempted delicate work of the kind. They had also at the Observatory been applying themselves to photography, and had taken negatives of the Sun with considerable regularity, though there were fewer spots to be observed now than at any former period which he could remember. Sir G. B. Airy also laid before the Society a map of the stars in the neighbourhood of Mars, during its next opposition in 1877, and drew attention to the great advantages which this opposition would offer for the determination of the solar parallax. Mr. De La Rue gave an account of the preparations that are being made both in France and Austria for the cultivation of physical astronomy. Professor Pritchard gave an account of the new Physical Observatory at Oxford, and of the mounting of the 12¼ inch refractor by Grubb, which has recently been bought by the University. Lord Lindsay read a note on the progress of the reductions of his observations of the Transit of Venus; and Mr. Bidder exhibited and described an observing chair of simple and inexpensive construction.

ANTHROPOLOGICAL INSTITUTE.

November 9th.—Col. L. Fox, President, in the chair.—Major T. F. Wilson was elected a Member.—Mr. F. Galton read the following papers: "Heredity in Twins." On comparing the number of twins found among the uncles and aunts of twins with those found in similar classes of society generally, it appears that twin-bearing is hereditary, in so far that there is an excess per cent. of three individuals of twin birth in the former group. It further appears that the male and female lines contribute the twin-bearing tendency in identical proportions. The families are very large in which twins are born; even those of their parents average nearly seven persons, but the twins themselves appear neither to marry so frequently nor to be so prolific as other persons. However, the common belief that both twins are in no case fertile is quite untrue.—"A Theory of Heredity." Starting with the generally admitted view that the body consists of a multitude of organic units, each of which is, to a certain degree, independent of the rest, and with certain postulates which that view implicitly recognizes, there exists a firm basis on which to establish a theory of heredity. By these and their necessary consequences the object of double parentage, and therefore of sex, was first explained by the likeness and dissimilarities observed between brothers and sisters, and the still more remarkable similarities and contrast between twins of the same sex were then accounted for. It was argued that the germs which were selected for development into the bodily structure had very small influence in an hereditary point of view, but it was those germs that were never developed, but remained latent, that were the real origin of the sexual elements. By this hypothesis, the almost complete non-transmission of acquired modifications was explained; also the occasional fact that strongly marked characteristics in the parents were sometimes barely transmissible; and, again, that of certain diseases skipping alternate generations.—Mr. F. W. Rudler read a "Report on the Department of Anthropology at the Belfast Meeting of the British Association."

ANTHROPOLOGICAL SOCIETY.

November 12th.—C. S. Wake, Esq., in the chair. The President, Dr. Charnock, read a paper "On the Origin of the Etruscans and their Language." The author traced the Etruscans to a Pelasgic colony from Lydia, otherwise called Mœonia. After referring to traditions, both Lydian and Etruscan, and to numerous classical authors in support of the theory, and to certain geographical names in Etruria, the author showed that the Etruscans resembled the Lydians in habits, manners, customs, and dress, and also in their sepulchral monuments; that their musical instruments were derived from Lydia, whence were introduced their stage-players, dancers, sports, games, and shows; that the appellation of the people may be traced to the name of a place at the foot of the Mesogis Mountains in Lydia, and that Etrusci, Tusci, and Rasena are etymologically the same word. There is no evidence of the Turanian origin of the Etruscan language, which is based upon the Old Pelasgic. It contains a few words from Persian and Phœnician, but none from the Celtic or Gothic-Teutonic languages. A great many words may be traced to the Greek; a lesser number are from, or allied to, the Latin. The vocabularies extant comprise only a very small part of the actual language, without reckoning a great number of proper names. In an examination of the grammar, Dr. Charnock showed resemblances between Etruscan, Greek, and Latin; especially that some of the declensions agree with the latter.

ENTOMOLOGICAL SOCIETY.

November 3rd.—Sir S. S. Saunders, President, in the chair.—This being the first meeting of the session in the new rooms, the President delivered an Inaugural Address, pointing out the advantages which might be expected from the Library and Meeting-room being brought into juxtaposition on a more central site, and also from the library being open to members during three days in each week instead of one day only. M. O. Lamarche, of Liége, was elected a Foreign Member. Mr. W. C. Boyd exhibited mines of *Heliozela sericiella* in oak. He had succeeded in rearing the insects by confining them with a young oak plant, and thus was enabled to discover their habits, which had hitherto been unknown. The mines were situated in the foot-stalks of the leaves. Mr. M'Lachlan exhibited a living apterous female of a terrestrial Trichopterous insect, Enoicyla (probably *E. pusilla*, Burm). He had recently bred it, with others, from cases forwarded to him by Mr. Fletcher, the discoverer of the insect in this country. Mr. M'Lachlan gave an account of its structure and singular habits. The perfect insects emerge in November, and the males are furnished with ample wings. Mr. Champion exhibited several rare Coleoptera, captured by him in Kent and Surrey. Mr. Phipson exhibited a *Catocala nupta*, with several acari on a portion of one of the anterior wings, instead of on the body, as is usually the case. The Rev. H. S. Gorham read descriptions of some new species and a new genus of Endomycici. Mr. A. G. Butler communicated "A List of the Lepidoptera referable to the Genus Hypsa of Walker's List, with Descriptions of New Genera and Species." Mr. E. Saunders communicated a second part of his "Synopsis of the British Hemiptera-Heteroptera." Mr. C. O. Waterhouse read "Descriptions of some New Genera and Species of Heteromerous Coleoptera (Helopidæ), chiefly from Terra del Fuego." The specimens had been brought to this country by Mr. Charles Darwin, and had been described many years ago by Mr. Waterhouse, sen., but the MS. had been unfortunately lost, and the insects had remained unnoticed till the present time.

PHYSICAL SOCIETY.

November 13th.—Prof. Gladstone, President, in the chair. The President stated that since the last meeting Prof. Everett's work, "On the Centimètre-Gramme-Second System of Units," had been published by the Society. Dr. Stone read a paper "On Thermopiles." He has recently been engaged on some experiments with a view to ascertain the best alloy for use in thermopiles. The thermo-electric power of a metal or alloy appears to be quite unconnected with its power for conducting heat or electricity, or with its voltaic relation to other metals, neither does it appear to have any relation to specific gravities or atomic weights. The thermopiles employed were of a form slightly modified from that employed by Pouillet in his demonstration of Ohm's law. Alloys are frequently more powerful than elementary metals, thus two parts antimony and one part zinc have a negative power represented by 22·70, while that of antimony is 6·96 or 9·43, and of zinc is 0·2. A strange exception, however, is that of bismuth and tin, for while the power of pure bismuth is + 35·8, when the two metals are alloyed in the proportion of twelve to one the power becomes — 13·67. Dr. Stone first used a couple consisting of iron and rich German silver, that is, rich in nickel. This was characterized by great steadiness, but the electro-motive force produced by moderate difference of temperature was not great. He then used Marcus' negative alloy, consisting of twelve parts antimony, five of zinc, and one of bismuth, but the crystalline nature and consequent brittleness of this mixture were found to be great objections to its practical use. It occurred to Dr. Stone that the addition of arsenic might diminish the brittleness without injuring the thermo-electric power, and on trial it was found that an alloy of zinc, antimony, and arsenic, with a little tin, formed a much less brittle mass than Marcus metal, with quite as great or greater thermo-electric power. A set of twelve couples of this alloy and German silver was exhibited. The electro-motive forces of this set, and of a similar one of twelve iron and German silver couples, were determined by Mr. W.

J. Wilson, and found to be, for one alloy and German silver couple, with difference of temperature of 80 deg. C., 1-108th of a Daniell's cell. The electro-motive force of one couple of the iron and German silver set was 1-648th of a Daniell's cell. The ordinary method of applying heat by a trough of hot water is objectionable, for the water short-circuits some of the current. This is evident from the fact that if oil heated to the same temperature be substituted, a considerably greater deflection is obtained. Another method suggested by the author which would tend to economy is to allow petroleum to volatilize in the neighbourhood of one face of the pile, thus chilling it, and to ignite the mixture of air and gas so produced at the other face. Clamond's pile consisting of iron and an alloy of zinc and antimony, was employed for some time, but, although good results were obtained, the iron is liable to rust at the connections.

GEOLOGICAL SOCIETY.

NOVEMBER 3RD.—J. Evans, Esq., President, in the chair. Messrs. T. Andrew, H. M. Becher, A. B. Kitchener, D. Morris, Dr. C. T. Richardson, and G. A. H. Thureau, were elected Fellows. The following papers were read: "On some New Macrurous Crustacea from the Kimmeridge Clay of the Sub-Wealden Boring, Sussex, and from Boulogne-sur-Mer," "On a New Fossil Crab from the Tertiary of New Zealand," "On a remarkable Fossil Orthopterous Insect from the Coal-Measures of Britain," "On the Discovery of a Fossil Scorpion in the English Coal-Measures," all by Mr. H. Woodward,—and "On the Drift of Devon and Cornwall, its Origin, Correlation with that of the South-East of England, and Place in the Glacial Series," by Mr. T. Belt.

CHEMICAL SOCIETY.

NOVEMBER 4TH.—Prof. Abel, President, in the chair. — The following papers were read:—"On the Decomposition of Stearic Acid by Distillation under Pressure," by Mr. G. Johnston,—"On Isomeric Terpenes and their Derivatives," being Part V. of their researches on this subject, and "On the Alkaloids contained in the Aconites, Part I.," by Dr. C. R. A. Wright and Mr. G. H. Beckett,—an "Account of a simple Form of Gas Regulator for Maintaining a Constant Temperature in Air-baths, Water-baths, Incubators, &c.," by Mr. F. J. M. Page,—"On the Fluorides of Arsenic Phosphorus and Iodine," and "On the Iodides of Antimony," by Mr. R. W. E. M'Ivor,—"On Tolylphenyl, a New Hydro-carbon," by Mr. T. Carnelly.

MATHEMATICAL SOCIETY.

NOVEMBER 11TH.—Prof. Cayley in the chair. The following gentlemen were elected as members of the new Council: President, Prof. H. J. S. Smith; Vice-Presidents, Dr. Hirst, Lord Rayleigh, and Mr. W. Spottiswoode; Treasurer, Mr. S. Roberts; Hon. Secretaries, Messrs. M. Jenkins and R. Tucker; Ordinary Members, Prof. Cayley, Prof. Clifford, Mr. T. Cotterill, Mr. J. W. L. Glaisher, Rev. R. Harley, Prof. Henrici, Mr. C. W. Merrifield, Prof. J. J. Sylvester, and Mr. H. M. Taylor. Mr. Tanner was elected a member; Major J. R. Campbell and Prof. G. M. Minchin were proposed for election; Messrs. H. M. Jeffery and Rhodes were admitted into the Society. Prof. Sylvester spoke at some length "On the Fifteen Young Ladies' Problem, and a General Mathematical Theory of Pure Syntax." Other communications made were: "On the Relation between Bernouilli's Numbers and the Binomial Co-Efficients," by Mr. J. Hammond, "On Three Bar Motion in Plane Space," by Mr. S. Roberts, "Values of certain Infinite Products, with an Application to the Summation of the Geometrical Series of the n^{th} Order as a Definite Integral," by Mr. J. W. L. Glaisher, "On the Form of Cam which, acting on a Lever, shall communicate a Motion such that the Angular Velocity Ratio of the Lever and Cam is a given Function of the Angle described by the Latter," by Major J. R. Campbell.

ZOOLOGICAL SOCIETY.

NOVEMBER 2ND.—Dr. E. Hamilton, V.P., in the chair.—The Secretary read a Report on the additions to the Menagerie in June, July, August, and September, and called particular attention to—1. A Cassowary, originally obtained from New Guinea by H.M.S. Basilisk. 2. A female Grant's Gazelle (*Gazella Granti*, Brooke) from East Africa. This species was previously only known from drawings. 3. A pair of giant tortoises (*Testudo Indica*). 4. A female Sumatran Rhinoceros (*Rhinoceros Sumatrensis*). 5. A young female Tora Antelope (*Alcelaphus Tora*), from Upper Nubia. 6. A young female Manatee (*Manatus Americanus*), which died suddenly on September 7th. Letters and communications were read from Signor L. M. D'Albertis, giving some account of several excursions made into Southern New Guinea from Yule Island,—from Mr. W. J. Hoffman, describing a Horn of an American Prong-horn (*Antilocapra Americana*), with a double Prong,—from Capt. J. Moresby, R.N., giving the exact locality of the young *Casuarius uni-appendiculatus*, presented by him to the Society,—from Dr. P. von Bleeker, on a rare Central-Asiatic Fish, *Elopichthys dahuricus*,—from Mr. E. A. Smith, on a new species of Carinifex, from California, which he proposed to name *Carinifex Ponsonbii*,—from Mr. Smith, on the genus Alaba, with the description of a New Species,—from Mr. W. T. Blanford, correcting certain errors in the Figures of *Herpestes ferrugineus* and *Ovis Polii*, in the Society's *Proceedings*,—by Mr. P. L. Sclater and Mr. O. Salvin, on two birds from Medellin, State of Antioquia, U.S.C., which appeared to be new to science, and were named *Catharus phaopleurus* and *Automolus holostictus*,—by Mr. A. H. Garrod, on the causes of death of the Indian Elephant, which died in the Gardens in July,—from the Rev. S. J. Whitmee, of Samoa, on the habits of the fishes of the genus Antennarius,—from Mr. G. E. Dobson, on the Bats of the genus Taphozous, Geoffr.,—from Dr. Otto Finsch, on the Pigeons of the genus Chrysœna,—from Dr. J. S. Bowerbank, being the fifth part of his Monograph of the Siliceo-fibrous Sponges.

MICROSCOPICAL SOCIETY.

NOVEMBER 3RD.—H. G. Sorby, Esq., President, in the chair.—Numerous donations to the Society were announced, including a series of photo-micrographs of dental sections, from Mr. C. Stodder, taken with one of Tolle's objectives.—Three new Fellows were elected.—An interesting paper was read by the President, "On a New Method of Measuring Bands in Spectra." It was first explained that by means of the ordinary quartz absorption band-plate, the exact position of a spectrum line, not coinciding with either of the absorption bands, could not be accurately determined; and the necessity for so doing having been shown, the author described and figured his new contrivance designed for the purpose. It consisted of a piece of quartz about 1½ in. thick, and cut with parallel surfaces exactly at right angles to the principal axis of the crystal, along the line of which there was no polarization. This gave a series of seven dark bands when placed between two Nicol prisms and viewed through the spectroscope. By rotating the upper prism the position of the first band could readily be made to coincide with any given fixed line—as D—and by the rotation of the lower prism the series of bands could be caused to traverse the entire spectrum, each half rotation moving them forward the precise amount of the distance existing between them. A graduated scale marked upon a circle attached to the lower prism enabled the position of the bands to be compared with great accuracy with that which they originally occupied, and, of course, also with that of any fixed lines shown in the comparison spectrum.—A paper, by Dr. J. J. Woodward, "On *Frustulia Saxonica*," was read, and some further observations upon the subject were made by Mr. Slack and Mr. Mayall.—It was announced that the Society would hold its first scientific Conversazione this season on the 24th November.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

NOVEMBER 2ND.—S. Birch, LL.D., President, in the chair.—The following papers were read: "On the Egyptian Mummy in the Collection of His Grace the Duke of Sutherland," by Dr. S. Birch,—"Some Osteological Notes on the same Mummy," by Prof. Flower,—"Observations on the Proportions of the above Skeleton," by Mr. J. Bonomi,—and "On some Fragments of the Babylonian Account of the Creation," by Mr. George Smith.

INSTITUTION OF CIVIL ENGINEERS.

NOVEMBER 9TH.—Mr. T. E. Harrison, President, in the chair.—The paper read was, "On the Manora Breakwater, Kurrachee," by Mr. W. H. Price, which is given more at large in another column.

November 16th.—Mr. G. R. Stephenson, V.P., in the chair. The paper read was "On the Pneumatic Transmission of Telegrams," by Mr. R. S. Culley and Mr. R. Sabine, which will be found to follow.

THE PNEUMATIC TRANSMISSION OF TELEGRAMS.

BY R. S. CULLEY, ESQ., M. INST., C.E., AND R. SABINE, ESQ., ASSOC. INST., C.E.

THIS paper, read at the meeting of the Institute of Civil Engineers on 16th November, commenced with a short sketch of the history of the process, and gave a statement of the extent to which it had now attained. There were twenty-four pneumatic tubes in London, of an aggregate length of seventeen miles 1,160 yards—four tubes in Liverpool, three in Dublin, five in Manchester, three in Birmingham, and one in Glasgow. The London system was described. When the number of tubes became large, it was found necessary to simplify the valves and sluices, rendering them less automatic, but easier to keep in order, than the earlier apparatus. Lead was preferred to iron as the material for the tubes. An experience of twenty-one years had shown that with felt message-holders, or carriers, there was no abrasion of the metal, which became highly polished, and that the tubes were practically air-tight, the exhaustion in one, 1,289 yards in length, occupying thirteen minutes in falling from 17·25 inches of mercury to atmospheric pressure, including the leakage from the valves. Iron had been used for two tubes, each 2,610 yards long, but it was found to rust rapidly, and to wear out the carriers. In the Paris system the iron tubes did not rust, and it was suggested that the difference was due to the air in Paris being cooled by water, and to the friction of the heavy carriers of iron covered with leather; while the air in London was used warm from the pumps, and the carriers were made as light as possible. The diameter adopted for the tubes was 2¼ inches, as being large enough to carry the traffic with sufficient speed, and not so large as to require a costly volume of air. The process of laying and joining the tubes was explained. The carriers were cylindrical boxes of gutta percha, covered with shrunk drugget; their weight was 2¾ ounces. The traffic was regulated by electric signals. Stoppages were rare, and were cleared by filling the tubes with water and applying pressure. It had never been necessary to open a lead tube, except in cases of bad construction, or of external injury caused by workmen. The engines were on the Wolff principle, and in ordinary work expended 134 I.H.P. The pumps were so arranged that each could be set to compress or to exhaust at pleasure, and the air-valves were fixed in sliding pieces, so that a defective valve could be quickly replaced.

The paper went on to show why a much more costly system of tubes, and much larger engines were required in this country than in Paris, Berlin, or Vienna, where the pneumatic system was also in operation. On the continent, with perhaps an exception as regarded the Paris Bourse, trains of carriers were run at fixed times, in Paris every quarter of an hour; but in England a message was never delayed—speed was the first requisite, and carriers followed one another as rapidly as possible. The tubes could not, therefore, as a rule, serve more than a single station; stations could not be grouped in circles; but each tube had to be direct, and as short as possible. An opinion expressed during a former discussion of the subject, that pneumatic was more costly than electric transmission, was shown to be erroneous; for the total expense of the former in London was barely two-thirds of the amount which would have been required to pay the salaries alone of the clerks needed under the latter, irrespective of the cost of wires and instruments.

Theoretical principles were next discussed. Formulæ were given for the mechanical effect performed by air in expanding, for the volume of denser air which entered the tube during the transit of a carrier, for the speed of carriers, for the times of transit, for the mean weight of a cubic foot of air both for pressure and for vacuum working, and for the work done in compressing and exhausting the air. The results of experiments followed. First special experiments on a tube 5,523 feet long, having an intermediate station; then, on another tube 4,227 feet long, showing the close coincidence of the actual times of transit under various pressures, with the times calculated by the formulæ previously given. The experiments showed also, that the speed of a carrier driven by compressed air was greater when the pressure was cut off after each transit; or, in other words, that there was a loss of speed when the air was kept constantly in motion. In the former case the carrier started into a comparative vacuum at atmospheric pressure; in the latter case into dense air; consequently the higher the pressure employed the greater the difference in speed —with 14 lbs. pressure the difference was 6 per cent. In working by vacuum a reverse result obtained. The experiments likewise demonstrated that the pressure fell to zero at the distant end and almost regularly with the length, but not quite so. With an initial pressure equal to 18 inches of mercury the pressure at the centre of a tube 8,454 feet long was 9·75 inches instead of 9 inches, and in every case there had been a higher pressure at intermediate points than that due to their position, when the fall of pressure was represented by a straight line. This result was attributed partly to the inertia of the air, partly to friction. The experiments also showed that when compressed air was admitted into a long tube, or the air was pumped out of it, a sensible time elapsed before the permanent condition of the air pressure was established. In a tube 5,523 feet long this interval was forty-five seconds for the end next the air-pump, and about seventy-five seconds for the centre of the tube. The temperature of the air issuing from a tube was not lowered to an extent corresponding with its expansion in the tube, because it gained heat from the soil in London; but in Berlin, where the tubes were bedded in dry sand, the theoretical temperature was more nearly attained. Comparing a 3-inch tube with a 2½-inch, it was shown that more than double engine power gave only 16 per cent. higher speed in the larger tube, so that any increase of diameter above that actually necessary to carry the traffic in the required time was attended with unnecessary expenditure. Again, by doubling the pressure only 30 per cent. in time was saved, but thrice the engine power was needed. In two tubes, each 1,000 yards long, one 3 inches and the other 2½ inches in diameter, by working the larger with a pressure of 5 lbs. and the smaller with one of 7 lbs. the transit was made in nearly equal times, while the engine powers were 2·6 H.P. and 2·1 H.P. respectively. The smaller tube at the higher pressure was therefore the more economical. The tubes should in consequence be as small as possible. The relative economy of working by vacuum, or by pressure, was then considered, to determine at which end of a tube, required for traffic in one direction only, the engine should be placed. It would at first sight appear that vacuum would be less expensive, because there was less weight of air to move than when using pressure. But as the rarefied air gained heat from the tube as it passed along, the volume which must be removed by the pump was greater than it would otherwise be; so that practically the cost of the two systems was the same. Then followed tables for the solution of the various economical questions connected with the system, and practical rules for their use, framed with the object of enabling those who wished to arrange systems of transmission to calculate the pressures, times, and power required.

INVENTIONS IN AMERICA.

The following are notices in the *Scientific American* of recent American patents:—

Improved Hatchway Brace. — James Fleming, Buffalo, N.Y.—This invention consists of adjustable braces which strengthen the sheave timbers, through which the rope attached to the grain shovels pass. The braces also serve to hold the elevator in position, and to protect the shovel ropes against chafing.

Improved Hanger for Sliding Doors. —Leeds A. Cook, Dansville, N.Y.—This is an improvement on the invention patented to same inventor, November 1st, 1870. The object is to simplify that device, and the arrangement is so modified as to consist of a sliding door hung to a swinging lever sliding into a slot of the main post, and supported centrally by a radius bar pivoted to said post, so as to be opened and closed by a parallel motion.

Improved Sleigh.—Benjamin F. Sweet, Fond du Lac, Wis.—The knee of the sleigh is constructed that it has considerable play or movement in the socket formed by the parts by which it is secured to the runner. The runners are hence adapted to yield somewhat to uneven surfaces, so that the bob will sustain heavy loads, and will glide over the snow with less friction than those whose frame is rigid.

Improved Wood Splitter. — William Latus, Brooklyn, assignor to T. Karutz, Brooklyn, E. D., N.Y.—This is a portable contrivance for splitting wood for lighting fires without damaging the hearth, or using a hatchet. There is a bed piece supporting a horizontal blade, which is caused to reciprocate by means of a handle connected to it by rack and pinion. The wood, being placed between the blade and stationary bed, is quickly split.

Improved Clothes Drier.—Lorin A. Wait, Riceford, Minn.—The arms on which the clothes are hung are attached to a collar which slides on a vertical post. They pass through slots in a revolving cap on top of the post, so that, when the collar is pushed up toward said cap, the arms extend radially, and when the collar is lowerd they fold in compactly. By this arrangement, the device can be stowed away in a small space when not in use.

Improved Key Fastener.—William W. White, New York City.—This is a useful little invention for travellers, inasmuch as it prevents the key of a door being turned by nippers or other instrument inserted in the keyhole from the outside. A bow of metal in form of a staple hangs on the knob shaft, and passes through the key-loop; and its ends are secured in a small block by means of a set screw.

Improved Non-Explosive Lamp.—Geo. W. Vernon, Bonsacks, Va.—The invention consists in a wick tube enlarged toward its upper end and provided with a divided neck, to form a channel discharging at the top of the tube. This is applied to a lamp having an oil reservoir below and a water chamber above, the wick tube passing down through the latter to the former. By this construction, the wick tube is kept cool, while, in case of an overturn, the flame is instantly extinguished.

Improved Beef Steak Tenderer.— Theophilus Billington, Weatherford, Tex. —This inventor proposes to pass the steak through studded rollers, mounted one above another on a stand. Said rollers may be adjusted for different thicknesses of meat, and may be pressed together by power easily regulated by the operator.

Improved Grain Separator. — Hermann Mielke, Watertown, Wis. — This machine is so constructed that the current created by the fan acts on the grain in its passage from the hopper, and separates the light grain from the heavier. The lighter falls on a laterally inclined plane, between partitions, and is conveyed to the side of the mill, the chaff and other impurities being conveyed over an outer inclined plane, extending downward from the second partition wall. The machine may be worked for any kind of grain by a simple regulation of the feed opening and current.

Improved Harvester. — Christopher Lidren, La Fayette, Ind, assignor to himself and R. Jackson, of same place.—In this invention, the novel features include a rake pivoted to the rake standard to swing backward and forward to discharge the gavels, together with devices which turn the rake or scraper up edgewise preparatory to going back to scrape off the gavel, and turn it down flatwise preparatory to going forward again. Arrangements are provided to pass the scraper forward below the platform and up through it and the grain which falls while a gavel is being discharged. There is also a means of returning the rake to the front without interfering with the grain lying on the platform, and a novel mode of supporting and adjusting levers for the reel, whereby it can be readily raised and lowered by the driver without moving from his seat, and without altering the tension of the belt.

Improved Mowing Machines.—David Wolf, Avon, Pa.—This inventor proposes ingenious mechanism for locking the cutter bar of a reaper or mower in different positions to adapt it for various kinds of work, and to enable it to be fastened upright for passing from place to place.

Improved Safety Oil Reservoir.—

Thomas Scantlin, Evansville, Ind.—This consists of a can or reservoir provided with a pump and with measuring compartments and a filling compartment and tube. The measuring vessels may be of different size, so as to hold the quantities usually called for, as one quart, two quarts, or a gallon. The oil is drawn, as it may be ordered, directly into the customers' vessels, and is not exposed to the air, or to danger from fire.

Improved Variable Measure.—Charles P. Sullivan, Jr., Line Creek, S. C.—This inventor has devised an ingenious method of combining several measuring vessels in one. The box has a moveable bottom which is shifted up or down in the interior and sustained by pivoted pieces from below, and by pins inserted through perforated hollow vertical tubes on the sides.

Improved Button Fastening.—James H. Harrington, Providence, R. I.—This is a new way of fastening buttons to garments so that they may be attached or detached without sewing. The button has a spring hook eye pivoted its back in which is inserted a ring.

Improved Medical Compound.—John W. Harvey, Memphis, Mo.—This invention relates to a new medical compound for the cure of catarrh. It is composed of nitrate of potash, chlorate of potash, powdered golden seal, table salt, and gum camphor, to be dissolved in water and used as a bath to the head and nose, or snuffed up the nose and inhaled in the form of a powder.

Improved Compression Cock.—James McLaughlin, New York city.—This compression cock is so constructed that it may be fully opened and closed by a half turn of the handle. The inventor states that it is entirely free from leakage, durable when used with both hot and cold water, and not liable to get out of order.

Improved Lubricator.—Joseph Warren Reed, Kalamazoo, Mich.—This is a hollow plug charged from the holder and discharged into the engine, at the same time cutting off the supply from the holder. The new features include, first, an improved contrivance of venting the hollow plug, by which there is no waste; second, of a valve to shut off steam from the holder to prevent the mixing of water with the oil by the condensation of steam; third, of a vent or waste pipe connecting with the space above the valve, to carry off the condensed steam in case the valve is not perfectly tight, and insure its closing; and, fourth, of a contrivance to regulate the amount of oil delivered.

Improved Road Engine.—John Henry Bange, Edwardsville, Ill.—This is a new and ingenious form of road engine, to which the name of the "Mountain Runner" has been given by its inventor. Many of the improvements are of a mechanical nature and cannot be clearly described without the aid of drawings. The principal feature, however, consists in the novel construction by which the water in each compartment, when the engine is passing up and down hill, finds its level independent of the water in the other compartments of the boiler, so that it cannot collect at the end of the boiler, but will be distributed through it.

Improved Device for Transmitting Power.—John Wesley, Woodruff, Jollytown, Pa.—This invention consists of the connection of a fly wheel by a long crank lever, of which one end is fixed to a point near the circumference of the fly wheel, while the other crank-shaped end turns a large spur wheel that intermeshes with a pinion of a shorter shaft with a transmitting pulley. The transmitting lever turns by a ball journal in socket bearings near the crank end. This enables the power of an engine to be transmitted for some distance and then applied directly to machinery.

Improved Car Wheel Chill.—William Wilmington, Toledo, Ohio.—This invention relates to certain improvements in chills for casting car wheels, and it consists in constructing the metallic annular chill with annular air chambers at the points of the interior surface of the chill where the outer periphery of the flange of the wheel is formed, and also at the points where the out horizontal surface of the tread is formed, by means of which the central portion of the tread which receives the greatest wear is allowed to harden: but the outer periphery of the flange and the outer surface of the tread are prevented from rapid cooling by the new conducting air chamber, and the metal at these points is moulded and preserved in its full strength and tenacity, a result to be greatly desired in view of the fact that, while the process of chilling hardens the iron, it greatly impairs its tenacity and strength.

Improved Elevated Railway.—John Westcott, Tocoi, Fla.—The object of this invention is to provide a cheaper construction of railroads and cars than that now in use, and it consists in a single iron rail laid upon and fastened to a continuous beam of wood, which is supported upon the ends of a series of piles driven into the earth so as to constitute an elevated railway. The cars have a single set of wheels, which have two flanges and run upon the rail, the bottom of the car being close to the rail, and the sides of the same extending down by the sides of the piles and engaging with friction rollers upon the same to steady and hold the car in position.

Improved Car Coupling.—Hugh F. McKervey, Cheboygan, Mich.—This invention is an improvement in car couplings of the harpoon variety, and it relates, first, to the combination and arrangement whereby the coupling bar is connected with a pivoted counterweight, and by it maintained in such position that lateral arms or shoulders formed on its middle portion will remain engaged with hooks and shoulders formed on the front end of the same drawhead which contains the counterweight. The invention consists, secondly, in the arrangement of a sliding bar in such relation to the counterweight, pivoted within the chamber of the drawhead, that the latter may be thereby raised, or turned on its pivots, and locked, or held in its elevated position by the side bar projection under it.

Improved Drive-Well Packing.—Vincent F. Thomacich, Mobile, Ala.—This invention relates to the packing of the drive-well or other pumps, and contemplates a prevention of the curling of the hard leather packing. It consists in a metallic ring support, concaved on the inside and bracing the leather packing of the piston.

Improved Spindle Bolster.—Welcome Jenckes, Manchester, N. H.—This invention relates to what is known as the spindle bolster of spinning frames, and consists of a longitudinal slot in the bolster, in which slot is placed a packing, which is saturated with oil for lubricating the spindle. By this arrangement, the spindle is kept lubricated for weeks continuously, and the trouble of oiling every day, as is usually the case, is obviated.

Improved Cotton Press.—Benjamin F. Platt, Vienna, La.—This is a very simple and inexpensive plan for applying hand or horse power to work the press. The press case is arranged on stationary pivots. Each pivot is screw-threaded, and has for its head one of the press followers in opposite directions at the same time, when the power is suitably applied.

Improved Lifting Jack.—Samuel E. Mosher, Chillicothe, Ohio.—In this device the lifting bar has downwardly-inclined teeth on one side in which teeth on the lifting dog engage. The dog is pivoted to a lever, which in turn is pivoted to swinging bars on top of the stand, so that the dog is drawn into the teeth on the bar when force is applied to the lever.

Improved Adjusting Feed Rolls for Planing Machines.—Charles D. Lawrence and Charles E. Ward, Fairfield, Me.—The feed rolls are mounted on a rod by bearings which can slide or be fixed in position as may be preferred. The bearings are moved by a shaft having pinions gearing with station racks. An arm connecting the lower sliding bearing turns it to shift a pinion along the feed roll to keep it in gear.

Improved Adjustable Bumper or Fender Plate for Piles of Elevated Railway.—John Westcott, Tocoi, Fla.—The object of this invention is to provide a bumper or fender plate for protecting the piles of elevated railways, in which the track consists of a single rail mounted upon a series of piles, and the car is provided with pendent extensions upon each side of the rail which extend down beside the piles. The invention consists in two symmetrically shaped curved plates faced upon the inside with elastic cushions and provided with flanges which are fastened together by means of screw bolts, so as to cause the said plates to tightly clamp the piles, and having lugs to keep them from turning.

Correspondence.

CLOTH AND WOOLLEN FACTORIES.

To the Editor of the Scientific and Literary Review.

Sir,—Within recent years some of the small county towns of Scotland have emerged from obscurity through the adoption of small cloth and woollen factories. Elgin led the way by a private concern, and, in 1867, the inhabitants of Banff, population 5,000, started a joint-stock factory, adapting as a permanent principal building a very large old granary, near the harbour, and within five minutes' walk of one of the railway stations; building a tall chimney, and obtaining some cottages on the embankment above for additional purposes. Tweeds, chiefly warm and shooting, and blankets and women's dress-stuffs are the staple. The farmers for miles round are large purchasers, they and their wives, daughters, male and female servants wearing scarcely anything else. The local and country gentry also patronize freely. The cloth stuffs are manufactured in very excellent patterns, and are purchased in a web at a time by old persons and heads of families. The capital to commence was £10,000, the undertaking being set on foot by the Provost (Mayor), and a few local solicitors, bankers, and shipowners. The writer believes an export trade might be pushed in such manufactures.

It has become a nicely remunerative concern. It occurs to the writer that this country would be very much benefited by observing the instance in question. Of course the rather congealed town mentioned has received an impetus through the trade, the traffic, and an influx of well-paid workmen and girls. Since, a very much smaller one has been set up in the little town of Keith, with perhaps 2,000 inhabitants, by a firm of leather merchants, entirely new, built of stone and slate. This has been equally successful. One cannot help thinking that in British Colonies—in some of the towns like those of New Zealand and Australia, Canada and Vancouver's Land—much prosperity might follow the establishment at once. There has surely been some oversight when the idea has not ere this been taken up in the colonies, excepting one in Queensland, noticed in the *Warehouseman and Draper's Gazette* in the spring.

It is quite possible such manufactories —a few—would pay if established in London. They could be confined to a particular part, or to a suburb if necessary; but this nuisance is not much, if indeed any, when properly managed. As to the stuff manufactured, there might be a special class of goods to be known as the "London." But it is to the provincial towns the writer refers the undertaking chiefly. There are many towns which, like Hertford, seem to have a tendency to do without trade. That town has particular facilities for the scheme—there has been erected recently a large colony of workmen's houses —very neat ones, within twenty minutes' walk of the main street. Others, like Coventry, where the local special trade is falling off, or in subjection, would be much the better for such a change, and the inhabitants would probably be found inclined to favour it. The writer believes that means have now been indicated of stimulating a number of English towns. Of course cloth and woollen factories would not pay if established right and left, but some other such project could be started.

Before leaving the subject we cannot help alluding to the beautiful and fashionable clothes worn in many of the towns in Belgium, furnished at extremely moderate price; it would be as well to inquire into this. Managers of English factories would do well to have passed some of their time at Belgian ones.

The opposition to the small factories on the part of proprietors of large manufactories in existence ought not to be great, because they might not be much affected, and could themselves be proprietors of some of them as instanced.—Yours obediently,

N. D.

TRADE MARKS REGISTRATION ACT.

SECTION 1.—A register of trade marks as defined by this Act, and of the proprietors thereof shall be established under the superintendence of the Commissioners of Patents, and from and after the first day of July one thousand eight hundred and seventy-six a person shall not be entitled to institute any proceeding to prevent the infringement of any trade mark as defined by this Act until and unless such trade mark is registered in pursuance of this Act.

Section 2.—(Characteristics of registered trade mark).—A trade mark must be registered as belonging to particular goods, or classes of goods; and when registered shall be assigned and transmitted only in connexion with the goodwill of the business concerned in such particular goods or classes of goods, and shall be determinable with such goodwill, but subject as aforesaid registration of a trade mark shall be deemed to be equivalent to public use of such mark.

Section 3.—The registration of a person as first proprietor of a trade mark shall be primâ facie evidence of his right to the exclusive use of such trade mark, and shall, after the expiration of five years from the date of such registration, be conclusive evidence of his right to the exclusive use of such trade mark, subject to the provisions of this Act as to its connexion with the goodwill of a business.

Section 4.—Every proprietor registered in respect to a trade mark subsequently to the first registered proprietor shall, as respects his title to that trade mark, stand in the same position as if his title were a continuation of the title of the first registered proprietor.

Section 5.—If the name of any person who is not for the time being entitled to the exclusive use of a trade mark in accordance with this Act, or otherwise in accordance with law, is entered on the register of trade marks as a proprietor of such trade mark, or if the registrar refuses to enter on the register as proprietor of a trade mark the name of any person who is for the time being entitled to the exclusive use of such trade mark in accordance with this Act, or otherwise in accordance with law, or if any mark is registered as a trade mark which is not authorised to be so registered under this Act, any person aggrieved may apply in the prescribed manner for an order of the court that the register may be rectified; and the court may either refuse such application, or it may, if satisfied of the justice of the case, make an order for the rectification of the register, and may award damages to the party aggrieved.

Where each of several persons claims to be registered as proprietor of the same trade mark, the registrar may refuse to comply with the claims of any of such persons until their rights have been determined by the court, and the registrar may himself submit or require the claimants to submit in the prescribed manner their rights to the court.

The court may, in any proceeding under this section, decide any question as to whether a mark is or is not such a trade mark as is authorised to be registered under this Act, also any question relating to the right of any person who is party to such proceeding to have his name entered on the register of trade marks, or to have the name of some other person removed from such register, also any other question that it may be necessary or expedient to decide for the rectification of the register.

The court may direct an issue to be tried for the decision of any question of fact which may require to be decided for the purposes of this section.

Whenever any order has been made rectifying the register the court shall by its order direct that due notice of such rectification be given to the registrar.

Section 6.—The registrar shall not, without the special leave of the court be given in the prescribed manner, register in respect of the same goods or classes of goods a trade mark identical with one which is already registered with respect to such goods or classes of goods, and the registrar shall not register with respect to the same goods or classes of goods a trade mark so nearly resembling a trade mark already on the register with respect to such goods or classes of goods as to be calculated to deceive.

It shall not be lawful to register as part of or in combination with a trade mark any words the exclusive use of which would not, by reason of their being calculated to deceive or otherwise, be deemed entitled to protection in a court of equity; or any scandalous designs.

Section 7.—Subject as aforesaid, a register office shall be established from and after such time (not being later than the first day of January one thousand eight hundred and seventy-six), in such manner and with such officers, and at such salaries, to be paid out of moneys provided by Parliament, as the Lord Chancellor may, with the consent of the Treasury, direct; and the Lord Chancellor may from time to time, with the assent of the the Treasury as to fees, make, and, when made, alter, annul, or vary, such general rules as to the registry of trade marks, and as to notices to be given by advertisement before the registration of trade marks, and as to the classification of goods for the purposes of this Act, and as to the registration of first and subsequent proprietors of trade marks, and as to the fees to be charged for registration, and also for the continuance of a trade mark on the register or otherwise, and as to the removal from the register of any trade mark, as to notices, and as to the persons entitled to inspect the register, and as to any proceeding to be taken to obtain the judgment or leave of the court in any matter in which the judgment or leave of the court is required to be obtained under this Act, and generally for the purpose of carrying into effect this Act, as he may deem expedient.

Any rules made in pursuance of this section shall be laid before both Houses of Parliament if Parliament be then sitting, or if not then sitting, then within ten days from the then next assembling of Parliament, and shall be of the same validity as if they had been enacted by Parliament; provided that if either House of Parliament resolve, within one month after such rules have been laid before such House, that any of such rules ought not to continue in force, any rule in respect of which such resolution has been passed shall, after the date of such resolution, cease to be of any force, without prejudice, nevertheless, to the making of any other rule in its place, or to anything done in pursuance of any such rules before the date of such resolution.

Section 8.—The certificate of the registrar as to any entry, matter, or thing which he is authorised by this Act, or any general rules made thereunder, to make or do, shall be evidence of such entry having been made, and of the contents thereof, and of such matters and things having been done or left undone.

Section 9.—(Provision as to Cutlers Company of Sheffield.)—With respect to the master, wardens, searchers, assistants, and commonalty of the Company of Cutlers in Hallamshire, in the county of York (in this Act called "the Cutlers Company"), anr the marks or devices (in this Act called "Sheffield corporate marks") assigned od to be assigned by the master, warden,s searchers, and assistants of that company, be it enacted as follows:

(1.) Within the prescribed time and in the prescribed manner the Cutlers Company shall at their own expense deliver to the registrar under this Act copies of all Sheffield corporate marks in force at the time of such delivery:

(2.) When any person, after the passing of this Act, applies to the said master, wardens, searchers, and assistants to assign to him any mark or device, notice of such application, with a copy of such mark or device, shall, within the prescribed time and in the prescribed manner, be delivered to the registrar under this Act; and such mark or device shall not be assigned until after the expiration of the prescribed period from the giving of such notice. In like manner, when any person applies for the registration under this Act of a trade mark as belonging to any goods or class of goods specified in section two of the Cutlers Company's Act of 1860, notice of such application, with a copy of such trade mark, shall, within the prescribed time and in the prescribed manner, be delivered to the Cutlers Company; and such trade mark shall not be registered until after the expiration of the prescribed period from the giving of the last-mentioned notice:

(3.) Upon the assigning of any such mark or device, or the registration of any such trade mark as aforesaid, notice of the assignment or registration shall, within the prescribed time and in the prescribed manner, be given to the registrar under this Act, or to the Cutlers Company, as the case may be:

(4.) The registrar under this Act, without the special leave of the court, to be given only in cases where the applicant proves his right, shall not in respect of any goods or classes of goods with respect to which a Sheffield corporate mark shall have been assigned and actually used, and of which mark a copy or description or notice of the assigning whereof shall have been delivered or given to the registrar as aforesaid, register a trade mak identical with such Sheffield corporate mark, or so nearly resembling the same as to be calculated to deceive:

(5.) The master, wardens, searchers, and assistants of the Cutlers Company shall not assign to any person a mark or device identical with any trade mark registered under this Act, and a notice of the registration whereof shall have been given to the Cutlers Company as aforesaid, or so nearly resembling the same as to be calculated to deceive:

(6.) Any person to whom a Sheffield corporate mark legally belongs shall be entitled to have the same mark registered also as a trade mark under this Act, in respect of any particular goods or classes of goods, in the same manner and upon the same terms and conditions in and upon which he might have registered the same if it were not a Sheffield corporate mark:

(7.) Nothing in this Act shall prejudice or affect the rights and privileges of the Cutlers Company, nor, save as is otherwise in this Act expressly provided, shall any of the provisions of this Act apply to or in the case of any Sheffield corporate mark.

Section 10.—(Definitions.)—For the purposes of this Act:

A trade mark consists of one or more of the followfng essential particulars; that is to say,

A name of an individual or firm printed, impressed, or woven in some particular and distinctive manner; or

A written signature or copy of a written signature of an individual or firm; or

A distinctive device, mark, heading, label, or ticket; and there may be added to any one or more of the said particulars any letters, words, or figures, or combination of letters, words, or figures; also

Any special and distinctive word or words or combination of figures or letters used as a trade mark before the passing of this Act may be registered as such under this Act.

"Prescribed" means prescribed by general rules made in pursuance of this Act; and

"Court" means any of Her Majesty's superior courts of law or equity at Westminster, or any court to which the jurisdiction of such courts may be transferred, or any one or more of such courts which may be declared to be the court for the purposes of this Act by such general rules as aforesaid; but the provisions of this Act conferring a special jurisdiction on the court as above defined shall not, excepting so far as such jurisdiction extends, affect the jurisdiction of any court in Scotland or Ireland in causes, actions, suits, or proceedings relating to trades marks; and if the register requires to be rectified in consequence of any proceedings in any such court in Scotland or Ireland, due notice of such requirements shall be given to the registrar, and he shall rectify the register accordingly.

11. This Act may be cited for all purposes as the Trade Marks Registration Act, 1875.

SCHOOL BOARD TYRANNY.

The *Times* of November 27th contains the following report:—Mr. Vockins, the Superintendent of Lambeth School Board District, attended to prosecute in several cases in which poor persons had been summoned for not sending their children to school. In one case the child was without a mother, and the father said the child had no boots. The child, who was in Court, appeared without boots. Mr. Ellison, the magistrate, said, had the father represented the matter to the Committee boots would, no doubt, have been provided. (How, or where from, does not appear.) The father said he had been in the China war and bore a good character. He sent the boy to one school and was told there was no room. Mr. Ellison ordered the defendant to pay a fine of 2s., and 2s. costs. The defendant said he had no money. The magistrate told him he would have to go to prison. The defendant, on leaving the court with the officer, exclaimed, "What, go to prison! Oh, what shall I do?" In other cases, fines were inflicted, varying from 1s. to 3s., and 2s. costs. We wonder that men like Mr. Ellison, belonging to that branch of the legal profession which possesses a great share of public esteem, who enjoy good salaries, good boots, and good dinners, can act so harshly in administering the law; certainly, it seems, that paid police magistrates are not so very different to the great unpaid, who supply us with so many instances of justices' justice.

APPLICATIONS FOR LETTERS PATENT.

(Continued from page 178.)

T. Melvin. Engines to be driven by steam, water, or other fluid, or for pumping.—H. R. Newton. Locking apparatus for regulating a constant measured small or large supply of filtered or unfiltered water, to be delivered into existing cisterns or other reservoirs, or by a new system into closed tanks.—M. Sault. Steam condensors (com.)—W. S. Berry and J. S. Jackson. Manufacture of certain woven fabrics known as "Elysans," "Witneys," "Beavers," and other woven fabrics of a similar character. —J. Howard. Harvesting machines.—J. A. Blacklock and W. G. Appleford. Sewing machines.

On October 13th.—3547 to 3558.—T. Fuller. Apparatus for syringing or watering plants.—J. W. Couchman. Means of and apparatus for raising sunken vessels, and also for preventing them from sinking.—R. Piel. Breech-loading fire-arm.—T. A. Dillon. Raising and floating submerged ships and other vessels.—J. Somerville. Cleaning and polishing of boots and shoes, and the mechanism or apparatus employed therefor.—E. J. Farries. Propelling carriages and boats.—R. Dutton and W. Renshaw. Machinery or apparatus for finishing velvets, velveteens, and other pile fabrics.—E. Muir. Dredging machines.—T. Snowdon. Furnaces and their fittings.—J. Hamblet and G. Davies. Dies or moulds of machines used for manufacturing bricks, tiles, pipes, and other like articles.—H. N. Maynard. Tubular structures for communication under water.—E. S. Kerr. Device for lifting and holding up the skirts of ladies' dresses.

On October 14th.—3559 to 3574.—T. Norman. Apparatus or appliances to be used in the manufacture of salt cake.—T. Smith. Planing machines.—W. Henderson. Machinery for dressing or surfacing stone, marble, and similar materials.—J. Taylor. Method of and apparatus for tightening the driving bands, cords, or chains employed in carding engines.—P. Jensen. Covers, boxes, or cases for holding cigarette papers and other articles (com.)—W. Durham. Purifying water.—R. Henderson. Construction of screw propellers and of the floats, paddles, or boards of paddle-wheels and water-wheels.—G. Baker. Machinery for the manufacture of certain kinds of wire lattice work or wire netting.—F. R. Baker. Manufacture of spools or reels for holding cotton, silk, and other threads.—R. Phelps, G. Phelps, and C. W. Phelps. Infants' and invalids' feeding bottles.—T. Warwick. Construction and manufacture of runners and top notches for umbrellas and parasols.—J. Schofield, H. Gledhill, and H. Watson. Means or apparatus for finishing woven fabrics.—J. Walsh and C. W. Stead. Machinery or apparatus for "papering" piece goods or woven fabrics for pressing and taking the papers out after pressing.—S. Knott and J. E. Harrison. Machinery for making what are commonly called "cop tubes" for spinning machinery, also applicable to making other tubes of paper or similar materials.—L. Griffiths and R. Lewis. Machinery for cleaning tin-plates.—R. Norfolk. Apparatus for moulding and casting axle-boxes or bushes and other similar articles.

On October 15th.—3575 to 3592.—R. Parlby. Portable wardrobes for travelling.—A. J. P. Delcarte. Telescopes.—W. Brownhill and T. H. Smith. Expediting the manufacture of welded iron or other tubes, as also the apparatus therefor.—G. Maclellan. Material or compound of caoutchouc with other substances.—W. A. Lyttle. Means and apparatus for deoxidating metallic ores, oxides, and sulphates, which are equally applicable to the coking, "charring," and destructive distillation of any solid organic matter, to the calcining of metallic ores, and to the production of carbonic oxide flame.—W. Cole. Manufacture of firelighters. —A. Barr. Apparatus for mincing meat, or for cutting or dividing other substances.—E. W. L. Price. Ships' anchors. W. H. Howes. Means or apparatus to be employed in the storage, carriage, and drawing off of petroleum and other inflammable liquids.—J. B. Fenby. Hydraulic cranes, also applicable to hydraulic machinery for forging and stamping, and for other like purposes.—J. Dyer. Benzoline lamps.—R. Lublinski. Tip fasteners for umbrellas, parasols, and sun-shades.—T. W. Rammell. Centrifugal machines for throwing air and other fluids, and communicating motive power thereby. — G. Graham and R. A. Allardyce. Boat davit for securing and prompt lowering of boats.—G. Cummings. Window shutters.—H. E. Newton. Apparatus for supplying water to steam boilers (com.)—C. L. Shaw. Construction of lockets.—C. Ingrey. "Safety" brake apparatus for perambulators and other similar vehicles.

The Death of Mr. William Sanders, F.G.S., at the age of seventy-six, has to be added to the obituary of men of science recently augmented by the names of Sir John Rennie and Professor Wheatstone. Mr. Sanders distinguished himself by geological studies of the Gloucestershire and Somersetshire coal-fields. A large geological map of the Bristol district of much importance and value was his great work.

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